CERIC

Central European
Research Infrastructure
Consortium

Report

2017

ERIC established by the European
Commision Implementing Decision
392/2014/EU

Open for Science

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Providing Open Access to Excellent Researchers

Jana Kolar
CERIC Executive Director

Dear Reader,

The Annual Report before you, the fourth since our establishment, showcases the variety of activities over the past year.
Our main business is to support science, and the use of CERIC's facilities offered through open access has led to discoveries in many different fields, including health, environment and climate change, energy and many more. Read in the report about the science potentially leading towards the development of organic electronics, or electronic applications based on graphene nanoribbons instead of silicon, about new chemotherapy systems, based on new classes of nanoparticles, novel ways of using plants as more effective filters and cleaners in polluted areas, and decreased methane emissions from natural gas vehicles, due to novel catalysis. These achievements of our users were complemented by the research undertaken within five internal research projects, co-funded by CERIC's various Partner Facilities and CERIC's central budget.
Last year was a successful one. The number of papers published in prestigious journals such as, among others, ACS Nano, the Journal of the American Chemical Society, Nature Communications, significantly increased over 2016, as did the number of applications submitted to our open calls, testifying to the increased attractiveness of CERIC to users.
While science is our main business, this report also highlights many other achievements, including in the field of education, communication and industrial liaison, and our efforts aimed at better management.
Beyond our core business, we have also contributed to the development of European policy, most notably with the keynote speech at the Informal Competitiveness Council of Ministers in Tallin and the organisation of two workshops with a focus on human resource management in an intergovernmental framework such as that of ERICs.
The functioning of CERIC is made possible by the considerable support from the Italian government and the in-kind contributions by our Member Countries, pooling resources in order to support CERIC's operations. On a project basis, our activities were supported by the European Commission, European Structural and Investment Funds, Regional Funds of Friuli Venezia Giulia, as well as the intergovernmental forum Central European Initiative, demonstrating how such funds can be used in synergy in the activities performed by CERIC.
It is always people who make the difference, of course, and I would like to express my sincere thanks to the scientists from our Partner Facilities and their directors, members of the Scientific and Technical Advisory Committee, members of the General Assembly and my colleagues in the administration for their dedication, enthusiasm and support.
I hope you enjoy reading the Annual Report.

Executive Summary

CERIC* had a successful year in 2017, as evidenced by the headline indicators presented in Table 1. A significant increase in value can be observed for all but the average impact factor (IF). The latter is a result of the strong effect that a Nature publication in 2016, not achieved in 2017, had on the average IF.

Headline Indicators	2015	2016	2017	% Change 2017-2016
Proposals received	108	119	195	64
Number of papers	4	21	36	71
Cumulative IF	11	122	182	49
Average IF	2,79	5,80	5,70	-1,72
Projects' funding (CERIC)	0	21.323,00	382.159,75	1692
Invited talks (reimbursed)	6	10	18	80
Students and researchers trained	30	79	126	59

Table 1
Headline indicators for 2015-2017 and changes in the last reported year

Excellent Science

In 2017, CERIC continued to provide access to its research infrastructure and contribute to the advancement of science. Its call for open access attracted 195 proposals, requesting the use of 348 instruments, a 34% increase over 2016. Proposals came from 36 countries and 5 continents.
The scientific output has also increased since 2016, which is reflected in the 71% increase in the number of scientific publications. In addition to more publications, the average Impact Factor, at 5.70, was similar to 2016.
CERIC also strengthened its internal research, aimed at the integration of national multidisciplinary facilities into a unique EU-level distributed Research Infrastructure. In addition to the three running projects, the General Assembly (GA), following the recommendation of the International Scientific and Technical Committee of CERIC (ISTAC), approved the financing of another CERIC internal project. The current four three-year projects are implemented through joint co-funding of the involved parties (in-kind, € 5.459.479), while the top-up is provided from funds for strengthening CERIC allocated by the Italian Ministry of Education, Universities and Research (MIUR, € 1.750.530). In addition, a CERIC employee, Dr. Aden Hodzic, was granted an internal research project.
To contribute further to integration and cooperation among the Partner Facilities (PFs), directors and researchers from CERIC's PFs met for a three-day intensive Science@CERIC workshop.
In order to develop further CERIC's instrumental capabilities, stimulate the development of CERIC's Research Infrastructure Roadmap and contribute to the integration of CERIC's facilities, the GA approved investment in CERIC's Research Infrastructure. To implement such a decision, in 2017 the Consortium published an internal invitation to collect proposals from its Members for the development of the instruments available in the PFs.
The quality of CERIC's instrumental and scientific support must be continuously monitored in order to assure its top quality. To this end, the first international periodic evaluation of the Austrian, Italian and Slovenian partner facilities (PFs) took place in 2017.

Training, Industrial Liaison, Communication, Projects

Training and up-skilling at all levels is strongly prioritised by CERIC. Fifty-eight high school pupils from the Italian Region Friuli Venezia Giulia were taken step by step through the stages of a scientific experiment, from planning managing, executing and evaluating a research project, to disseminating its results. CERIC also contributed to HERCULES school training of 24 Ph.D. students. Outreach activities, aimed at training the users of tomorrow from less R&D developed regions included the establishment of a CERIC outpost in Ukraine, while a targeted workshop brought together 27 researchers from 14 countries in Central and Eastern Europe.
Particular attention was also paid to the training of CERIC's administrative staff. CERIC's Deputy Director, Ornela De Giacomo, was selected to attend a Master in RI Management in 2018, the Consortium's Chief Administrative Officer, Andrea Santelli, was chosen to attend a two-year Executive Master Degree in Management of RIs, while the Communications Officer, Nicoletta Carboni, joined the Policy and Communications Unit at the European Institute of Technology in Budapest for a month.
CERIC's strategy for Industrial Liaison & Technology Transfer (IL&TT) was further developed throughout 2017. In addition, networking with the main actors of the innovation system and promoting CERIC's offer was a continuous activity throughout the year.
In the field of communication, a landmark was definitely the launch of a new visual identity. A social media strategy has also been adopted and a continuous social media presence assured.
In addition to ordinary funding, CERIC received also funding for regional, national and European projects (i.e. H2020 ACCELERATE, H2020 E-RIHS, CEI CONTACT, MIUR workshop, PaGES2).
CERIC's first H2020 projects started running in 2017. ACCELERATE aims to support the long-term sustainability of large scale research infrastructures (RIs) through the development of policies and legal and administrative tools for more effective management and operation of RIs, with special focus on ERICs and CERIC in particular. E-RISH is a preparatory project for a new addition to the ESFRI Roadmap, focusing on the field of cultural heritage. The CERIC's PFs also successfully applied for R&D funding: the RETINA project started in the frame of the Interreg programme Slovenia-Austria, co-financed with ESIF funds in the amount of € 31.491,32 in 2017.

Open for New Members

In 2017, a new Member, Croatia, formally joined the Consortium, after the unanimous approval of the CERIC General Assembly. The Ruđer Bošković Institute in Zagreb has been formally appointed to offer its scientific and technical resources through CERIC calls for open access. Furthermore, GA appointed FAMA as prospective Serbian Partner Facility (PF) in CERIC for a period of two years, during which the facility must develop all the necessary procedures for an efficient user service to the international community, and the Government must adopt the ERIC Regulation.

Management and Finance

Management activities focused on ensuring high quality functioning of CERIC and quality support to users.
Members of the International Innovation Advisory Board were appointed within the frame of the ACCELERATE project, to complement the activities of the International Scientific and Technical Advisory Board. Monitoring continued using the GA approved set of performance indicators, while the development of a methodology for the elaboration of socio-economic impact continued with the help of the Rathenau Institute. To support the long-term sustainability, the variety of funding sources and their potential use in synergy were reviewed. CERIC has also developed its first Data Management Plan and procedures for Fast Track.
In the field of human resources, transparent and merit-based recruitment policies continued to be implemented. In addition, CERIC established fiscal representations in Poland and the Czech Republic, which allowed to hire scientific and technical personnel employed for CERIC's internal research projects in these countries. A range of activities also focused on the further development of the ERIC legal framework.
A Collaboration Framework Agreement was also concluded between CERIC-ERIC and Elettra - Sincrotrone Trieste S.c.p.A., detailing the relations between the two institutions for the next three years.
Finally, the Methodology for Accounting In-kind Contributions adopted in 2016, was implemented for the collection of data for 2017, as shown in the Notes to the Financial Statements. The final section presents the financial and economic situation of the Consortium, outlined through statements presented under the accrual basis of accounting according to the International Public Sector Accounting Standard.

CERIC Overview

CERIC-ERIC is an integrated multidisciplinary research infrastructure for basic and applied research in all fields of materials, biomaterials and nanotechnology. Located in 8 countries of Central and South-eastern Europe (Austria, Croatia, Czech Republic, Hungary, Italy, Poland, Romania and Slovenia), it is open to researchers from all over the world. It offers a single access point to state-of-the-art facilities and techniques based on the use of electrons, ions, neutrons and photons. Each Member Country contributes to CERIC a high-quality PF which is available to researchers, depending on a positive review from the International Scientific and Technical Advisory Committee (ISTAC) of CERIC.

*For an overview of CERIC and its main goals and activities, see chapter 5 "CERIC Overview"

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Excellent Science

Main Achievements

1. **Implementation of 2 calls for free open access** to which 195 proposals, requesting the use of 348 instruments, were submitted. This is a 34% increase over the previous year.
2. **Proposals came from 36 countries and 5 continents**
3. **A 71% increase in the number of scientific publications**
4. **Positive evaluation of two CERIC Partner Facilities** by the international team of experts led by CERIC's International Scientific and Technical Advisory Committee (ISTAC)
5. **Positive evaluation of the progress of three CERIC internal research projects, and selection and award of a fourth one, MAG-ALCHEMI**

Open Access

CERIC's main aim is to enable excellent science, both as an in-house activity and as a service to international users. This is achieved mainly by providing open access to its research facilities.

In 2017, CERIC organized two open access calls for proposals to the Consortium's research infrastructure; 195 proposals were received (Figure 1). Due to their multi-technique character, this corresponded to 348 single instrument proposals, which is a 34% increase over 2016. There were 158 experiments approved. The number of allocated experiments increased significantly, by nearly 10% in comparison to the previous year (Figure 2). This number corresponds to a total of 11.200 hours of measurements.

The majority of applicants requested access to multiple facilities, which is still the distinguishing and most appealing characteristic of CERIC.

Figure 1
Number of proposals and requested methods

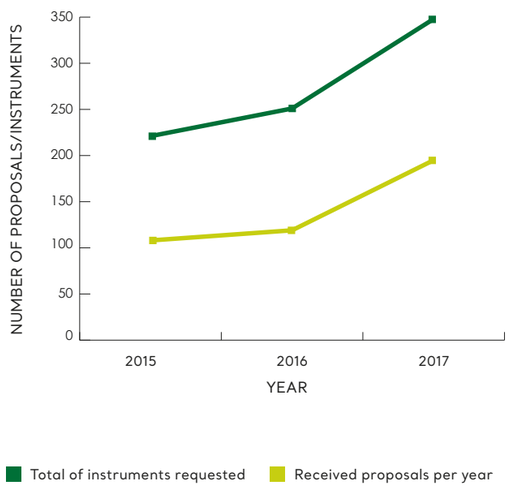
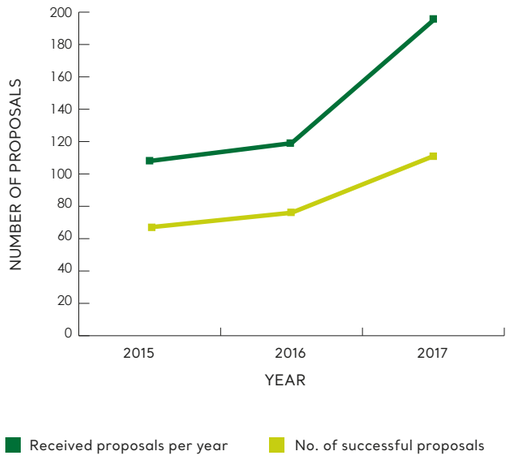
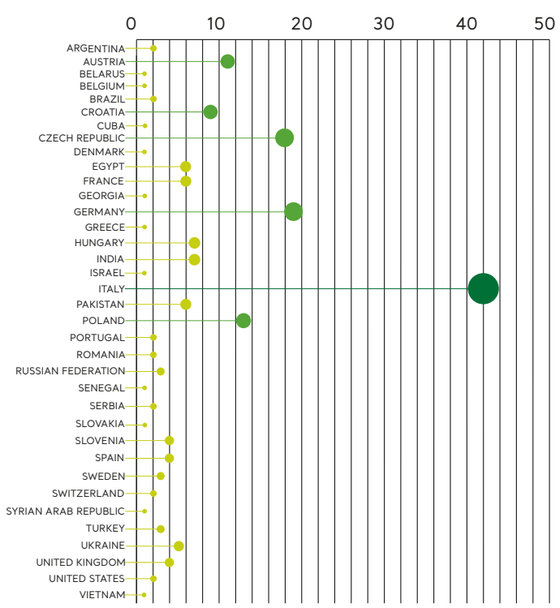


Figure 2
Number of received and successful proposals per year

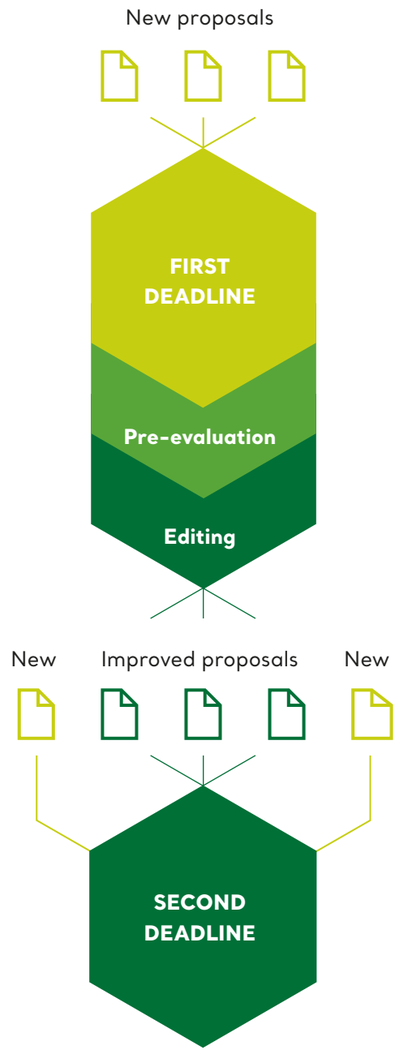


CERIC remains a highly internationalised research infrastructure, with principal investigators from 36 countries and five continents in 2017, 50% of them from non-EU countries (Figure 3).

Figure 3
No. of proposals by country

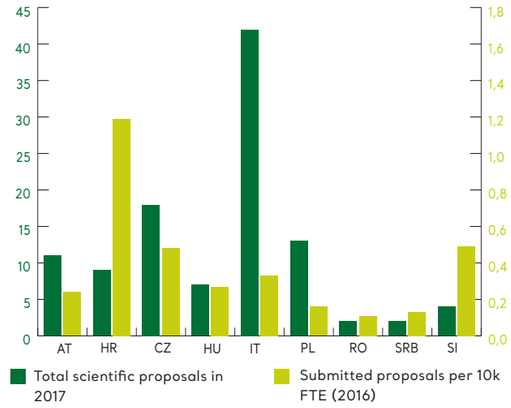


- **2 calls for proposals**
- **195 proposals received**
- **Research groups from 36 countries**
- **158 allocated requests**



Nevertheless, the majority of submitted proposals (55%) came from CERIC Member Countries. This is to be expected, since CERIC is a recent addition to the European research infrastructure landscape and is still not well known beyond its Member Countries. The most active users, in terms of full time employees in Research & Development in a country, are from Croatia, followed by Slovenia and the Czech Republic.

Figure 4
Proposals per 10K full time employees in R&D in Member Countries



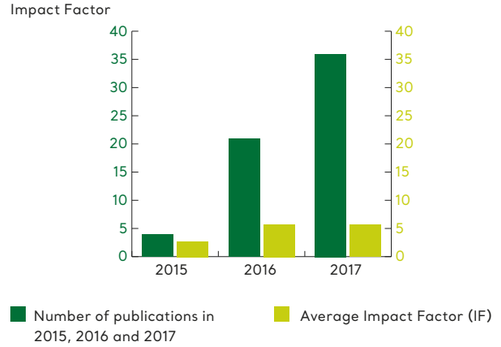
In 2017, 36% of the principal investigators and 38% of the researchers who performed the measurements at the facilities were women (Figure 5).

Figure 5
Gender distribution of CERIC users

Quality of the Output

In 2017, the number of publications stemming from measurements taken at the CERIC facilities increased by 71%, while the average Impact Factor (5,70) remained at a similar level as the year before (a decrease of 1,72% - Figure 6).

Figure 6
Number of scientific publications* in 2015, 2016 and 2017 and average Impact Factor



*This number comes from the CERIC's publication database, so it may be lower than the actual number of papers published.

Science@CERIC

To strengthen internal research and ensure scientific excellence, the development of a strong scientific community within CERIC is of key importance. To this purpose, directors and researchers from CERIC's Partner Facilities (PF) met in Austria in May 2017 at the workshop Science@CERIC, to get acquainted with the ongoing activities and research interests of the other PFs and to identify common topics for joint research and development activities. Participants also discussed funding opportunities in which PFs, in the framework of CERIC, could have competitive advantages.
The workshop was a valuable occasion for highlighting the possibilities offered by specific facilities, instruments and projects, showing achievements, future development plans and possible areas of further interactions.

International Scientific and Technical Advisory Committee - ISTAC

The purpose of the International Scientific and Technical Advisory Committee of CERIC-ERIC, is to provide the CERIC General Assembly (GA) with recommendations on scientific and technical issues that bear on the full and effective utilization of CERIC-ERIC as a state-of-the-art Research Infrastructure, and on developments required to maintain its scientific productivity at the highest possible level and ensure its relevance to the requirements of the international scientific community. In particular, the ISTAC evaluates proposals for new Partner Facilities, and the operation of existing ones, advising the General Assembly on acceptance and continuation.
The first periodic evaluation of the Austrian, Italian and Slovenian partner facilities (PFs) took place in May 2017 (see p.19). In the same year, ISTAC welcomed two new members: Guy Schoehn and Salvador Ferrer, before expiration of the mandate of Cecile Hebert and Christian Vettier. CERIC-ERIC and the chairman of the ISTAC express their deep gratitude to these two outgoing members for their valuable contribution, from the moment CERIC was conceived, through its constitution as an ERIC and for the first two years of operation.

Scientific Publications

Thirty-one articles were published in 2107, with a cumulative impact factor of 182.44 (versus 121,93 in 2016) and an average impact factor of 5.70 (versus 5.80 in 2016):

(1) *Unraveling the resistive switching effect in ZnO/0.5Ba(Zr0.2Ti0.8)O3-0.5(Ba0.7Ca0.3)TiO3 heterostructures*, Silva J.B.P., Vorokhta M., Dvorák F., Sekhar K.C., Matolín V., Agostinho Moreira, J., Pereira, M., Gomes M.J.M., Applied Surface Science, 2017 400, 453-460

(2) *Experimental and Theoretical Investigation of the Restructuring Process Induced by CO at near Ambient Pressure: Pt Nanoclusters on Graphene/Ir(111)*, Podda N., Corva M., Mohamed F., Feng, Z.,Dri C., Dvorák F., Matolín V., Comelli G., Peressi M., Vesseli E., ACS Nano, 2017

(3) *The effect of sulfur dioxide on the activity of hierarchical Pd-based catalysts in methane combustion*, Monai M., Tiziano M.,Melchionna M., Duchoň T., Kúš P.,Chen C., Tsud N., Nasi L., Prince K.C., Veltruská K., Matolín, V., Khader M., Gorte, R., Fornasiero P., Applied Catalysis B: Environmental, 2017, 200, 72-83

(4) *Structural basis of human PCNA sliding on DNA*, De March M., Merin, N., Barrera-Vilarmau, S., Crehuet R., Onesti, S., Blanco, F.J., De Biasio, A., Nature Communications, 2017, 8, 13935

(5) *Microstructural characterization of dental zinc phosphate cements using combined small angle neutron scattering and microfocus X-ray computed tomography*, Viani A., Sotiriadis K., Kumpová I., Mancini L., Appavou M., Dental Materials, 2017

(6) *Dynamics and interactions of ibuprofen in cyclodextrin nanosponges by solid-state NMR spectroscopy*, Ferro M., Castiglione F., Pastori N., Punta C., Melone L., Panzeri W., Rossi B., Trotta F., Mele A, Beilstein Journal of Organic Chemistry, 2017, 13, pp. 182-194

(7) *A new light on Alkaptonuria: A Fourier-transform infrared microscopy (FTIRM) and low energy X-ray fluorescence (LEXRF) microscopy correlative study on a rare disease*, Mitri E., Millucci L., Merolle L., Bernardini G., Vaccari L., Gianoncelli A., Santucci, A., Biochimica et Biophysica Acta (BBA) - General Subjects, 2017

(8) *Structure of a Stable G-Hairpin*, M. Gajarský, M. Lenarčič Živković, P. Stadlbauer, B. Pagano, R. Fiala, J. Amato, L. Tomáška, J. Šponer, J. Plavec and L. Trantírek, J. Am. Chem. Soc., 2017, 139 (10), pp. 3591-3594

(9) *Unraveling surface state and composition of highly selective nanocrystalline Ni-Cu alloy catalysts for hydrodeoxygenation of HMF*, Luo J., Monai M., Wang C., Lee J.D., Ducho T., Dvoák P., Matolín V., Murray C.B., Fornasiero P., Gorte J.P., Catal. Sci. & Technol., 2017

(10) *On the threshold for ion track formation in CaF2*, Karlušić, M., Ghica, C., Negrea, R.F., Siketić, Z., Jakšić, M., Schleberger, M., Fazinić, S, New Journal of Physics , 2017, 19, 2

(11) *Redox-mediated conversion of atomically dispersed platinum to sub-nanometer particles*, Lykhach Y., Figueroba A.,Skala T., Duchon T., Tsud N., Aulicka M., Neitzel A., Veltruska K., Prince K.C., Matolın, V., Neyman K.M., Libuda J., J. Mater. Chem. A, 2017, 5, 9250

(12) *Oxygen partial pressure dependence of surface space charge formation in donordoped SrTiO3*, Andrä M., Dvořák F., Vorokhta M., Nemšák S., Matolín V., Schneider C.M., Dittmann R., Gunkel F., Mueller D.N., Waser R., APL Materials, 2017,5, 056106

(13) *Oxide-based nanomaterials for fuel cell catalysis: The interplay between supported single Pt atoms and particles*, Lykhach Y., Bruix B., Fabris S., Potin V., Matolínová I., Matolín V., Libuda J., Neyman K.M., Catalysis Science and Technology, 2017

(14) *Interfacial interactions between CoTPP molecules and MgO(100) thin films*, Franke M., Wechsler D., Tariq Q., Rockert M.,Zhang L., Thakur P.K., Tsud N., Bercha S., Prince K.C., Lee T., Steinrucka H., Lytken O., Phys. Chem. Chem.Phys, 2017, 19, 11549

(15) *Electrochemically shape-controlled transformation of magnetron sputtered platinum films into platinum nanostructures enclosed by high-index facets*, Khalakhan I., Lavková J., Matolínová I., Vorokhta M., Potin V., Kúš P., Václavů, M.,Maraloiuc V.-A., Kuncserc A.-C., Matolín V., Surface Coatings Technology, 2017, 309, 6-11

(16) *Structural and optical properties of a perylene bisimide in aqueous media*, Burian M., Rigodanza F., Amenitsch H., Almasy, L., Khalakhan I., Syrgiannis Z., Prato, M., Chemical Physics Letters, 2017, 338, 454-458

(17) *Investigation of amorphous and crystalline phosphates in magnesium phosphate ceramics with solid-state 1H and 31P NMR spectroscopy*, Viani A.,Mali G., Mácová P., Ceramics International, 2017, 43-8, 6541-6579

(18) *Correlations between photocatalytic activity and chemical structure of Cu-modified TiO2-SiO2 nanoparticle composites*, Cizimar T.,Stangar U.L., Arcon I.,Catalysis today, 2017, 287, 155-160

(19) *Making graphene nanoribbons photoluminescent*, Senkovskiy B.V.,Pfeiffer M.,Alavi S.K,Bliesener A.,Zhu J.,Michel M.,Fedorov A.V., German R.,Hertel D.,Haberer D.,Petaccia L., Fischer F.R.,Meerholz K.,van Loosdrecht P.H.M., Lindfors H., Grüneis A., Nanoletters, 2017, 17-7, 4029-4037

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(21) *Spectroscopic characterization of N=9 armchair graphene nanoribbons*, Senkovskiy B.V., Haberer D., Usachov D.Y., Fedorov A.V., Ehlen N., Hell N.,Petaccia L., Di Santo I., Durr R.A., Fischer F.R., Grüneis A., Physica Status Solidi (RRL) - Rapid Research Letters, 2017, 11-8, 1700157

(22) *Correlation between collective and molecular dynamics in pH-responsive cyclodextrin-based hydrogels*, Bottari C., Comez L., Corezzi S., D'Amico F., Gessini A.,Mele A., Punta C., Melone L., Pugliese L., Masciovecchio C Rossi B.,Phys. Chem. Chem. Phys, 2017, 19, 22555-22563

(23) *Lyotropic Liquid-Crystalline Nanosystems as Drug Delivery Agents for 5-Fluorouracil: Structure and Cytotoxicity*, Astolfi P., Giorgini E., Gambini V., Rossi B., Vaccari L., Vita F., Francescangeli O., Marchini C., Pisani M., Langmuir, 2017, 33 (43), pp. 12369–12378

(24) *The role of natural biogeochemical barriers in limiting metal loadingto a stream affected by mine drainage*, De Giudici G., Pusceddu C., Medas D., Meneghini C., Gianoncelli A., Rimondi C., Podda F., Cidu R., Lattanzi P., Wanty R.B., Kimball B.A. Applied Geochemistry, 2017, 76, pp. 124-131

(25) *Stability of biological and inorganic hemimorphite: Implications for hemimorphite precipitation in non-sulfide Zn deposits*, Medas D., Meneghini C., Podda F., De Giudici G., Ore Geology Reviews, 2017, 89, 808-821

26) *Mechanistic study of Magnesium-Sulfur batteries*, Robba A., Vizintin A., Bitenc J., Mali G., Arčon I., Kavčič M., Žitnik M., Bučar K., Aquilanti G., Martibeau-Corcos C., Randon-Vitanova A., Dominiko R., Chemistry of Materials, 2017, 29

27) *Monitoring Ion track formation using in situ RBS/c, ToF-ERDA, and HR-PIXE*, Karlušić M., Fazinić S., Siketić Z., Tadić T., Domagoj Cosic D., Božičević-Mihalić I., Zamboni I., Jakšić M., Schleberger M., Materials, 2017, 10, p. 1041

28) *Single-Photon-Emitting Optical Centers in Diamond Fabricated upon Sn Implantation*, Tchernij S.D., Herzig T., Forneris J., Küpper J., Pezzagna S., Traina P., Moreva E., Degiovanni I.P., Brida G., Skukan N., Genovese M., Jakšić M., Meijer J., Olivero P., ACS Photonics, 2017, 4, pp. 2580-2586

29) *Thermally Controlled Bonding of Adenine to Cerium Oxide: Effect of Substrate Stoichiometry, Morphology, Composition, and Molecular Deposition Technique*, Bercha S., Beranová K., Acres R.G., Vorokhta M., Dubau M., Matolínová I., Skála T., Prince K.C., Matolín V., Tsud N., The Journal of Physical Chemistry C, 2017, 121, 45, pp. 25118-25131

30) *Removing photoemission features from Auger-yield NEXAFS spectra*, Lytken O., Wechsler D., Steinrück H.P., Journal of Electron Spectroscopy and Related Phenomena, 2017, 218, pp. 35-39

31) *One-Step Synthesis of Mesoporous Silica Thin Films Containing Available COOH Groups*, Escobar A., Yate L., Grzelczak M., Amenitsch H., Moya S.E., Bordoni A.V., Angelome P.C., ACS Omega, 2 (8), 2017, pp 4548-4555

32) *Structural investigation of As-Se chalcogenide thin films with different compositions: formation, characterization and peculiarities of volume and near-surface nanolayers,* Kondrat O., Holomb R., Mitsa V., Veres M., Tsud N., Functional Materials, 24, 2017

33) *Influence of Metal Catalyst on SnO2 Nanowires Growth and Gas Sensing Performance,* Zappa D., Belloni R., Maraloiu V., Poli N., Rizzoni M., Sberveglieri V., Sisman O., Soprani M., Comini E., Proceedings, 1 (4), 2017, p 460

34) *Fluorinated Ether Based Electrolyte for High-Energy Lithium–Sulfur Batteries: Li+ Solvation Role Behind Reduced Polysulfide Solubility*, Drvaris Talian S., Jeschke S., Vizintin A., Pirat K., Argon I., Aquilanti G., Johansson P., Dominik R., Chemistry of Materials, 29 (23), 2017, pp 10037-10044

35) *NAP-XPS Study of Ethanol Adsorption on TiO2 Surfaces and Its Impact on Microwave-Based Gas Sensors Response*, Bailly G., Rossignol J., Stuerga D., Pribetich P., Domenichini B., Proceedings, 1 (4), 2017

36) *$MoSe_xO_y$-Coated 1D TiO2 Nanotube Layers: Efficient Interface for Light-Driven Applications*, Ng S., Krbal M., Zazpe R., Prikryl J., Charvot J., Dvorak F., Strizik L., Slang S., Sophia H., Kosto Y., Matolin V., Kwong Yam F., Bures F., Macek J.M., Advanced Materials Interfaces, 5 (3), 2017

Scientific Highlights

"Aromatic" molecules for water-based electronic devices[1]

Organic electronics are a mainstream field of research in chemistry and materials science. Unlike conventional inorganic electronics, which is mainly based on silicon and several kinds of metals, organic electronic materials are constructed from small carbon-based molecules specially designed and synthesized for electronic applications. Such molecules are often ring-shaped (cyclic) and contain free moving electrons to ensure sufficient conductivity. Chemists call them “aromatics”. The possibility of creating tailor-made molecules for various kinds of applications promises more versatile devices with reduced production costs. Although organic electronics can already be found in commercial TV displays and smart watches, new molecules for other applications still need to be designed and synthetized.

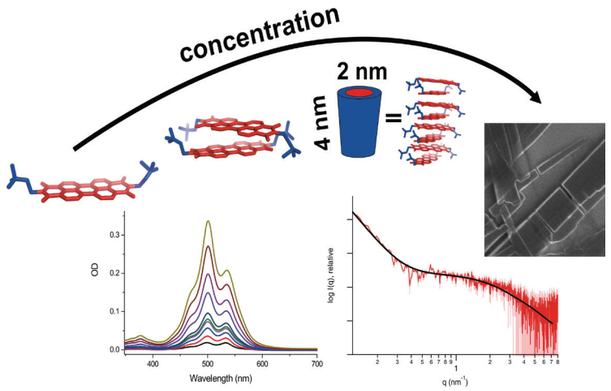


Figure 7
The figure shows the structural transition of Perylene in water upon increasing concentration, ranging from single molecule to highly ordered cylindrical nanocrystals as determined by means of x-ray and neutron scattering.

The electronic properties of such organic devices depend not only on the compound itself, but also on the structure that the molecules form when they are packed together in a material. This so-called superstructure determines how well electrons can be exchanged between the single molecules, to ensure optimal sensitivity, e.g., light-capture applications in solar cells. The team around **Max Burian** of the group of **Heinz Amenitsch** from Graz University of Technology, and **Zois Syrgiannis** from the University of Trieste, conducted a study on the formation of such superstructures. They used an aromatic Perylene derivative, one of the most commonly used molecules in organic electronics, and dissolved it in water. They then used a combination of small-angle X-ray scattering, scanning electron microscopy and small-angle neutron scattering, available at the Austrian, Czech and Hungarian CERIC Partner Facilities, respectively, to determine the superstructure that the molecules form. They discovered that when dissolved in water, Perylene first forms dimers of two molecules in low concentrations. It then develops into highly ordered cylindrical nanocrystals at higher concentrations, which, most importantly, lose their ordering when the solution is dried. Such information about the development of Perylene superstructures will help in finding good synthesis routes for designing organic electronics for many applications.

“With our study we observed the changes in the molecular structure of Perylene, and how these affects its electronic properties. Our results may help finding new synthesis routes to design organic electronics for many applications”

[1] *Structural and optical properties of a perylene bisimide in aqueous media,* Burian M., Rigodanza F., Amenitsch H., Almasy, L., Khalakhan I., Syrgiannis Z., Prato, M., Chemical Physics Letters, 2017, 338, 454-458, DOI: 10.1016/j.cplett.2017.03.056

New class of nanoparticles developed towards more effective cancer treatment[2]

Cancer is one of the most common causes of death in developed countries, and the fight against it is one of the highest priorities in medical research. Chemotherapy usually uses drugs targeting cancer cells and hindering their procreation. Since cancer cells are very similar to normal ones, healthy cells are usually also affected. This results in very harsh side effects and irreversible damage to healthy tissues. To minimise them, the drugs' dosage should be lowered. Researches are therefore constantly looking for ways of using anti-cancer drugs in a more targeted way, to attack the cancer and keep non-infected organs healthy.
In recent years, nanomedicine - the use of nanotechnology for medical purposes - has received wider attention among the scientific community. The main idea behind drug carriers developed in nanomedicine is to load the drug into a nanoparticle and inject it into the body. Nanoparticles are much smaller than cells and they can be functionalised so that they "detect" and target tumour cells without too much damage to neighbouring tissues. Although great progress has been made in nanomedicine in past decades, there are still problems to be solved. One of them is to find a stable enough structure able to survive the conditions in the human body, and also to take up and release the active drug.

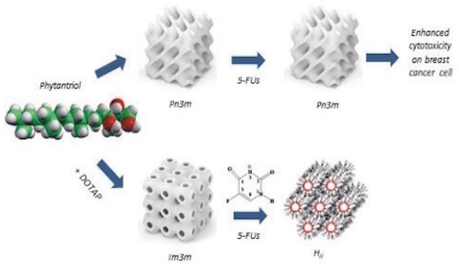


Figure 8
Phytantriol and Phytantriol/cationic lipid mesophase behaviour on encapsulation of the chemotherapy agent. Enhancement of the cytotoxicity of the drug on breast cancer cells was observed.

The research group around **Michela Pisani**, CERIC user from the Università Politecnica delle Marche in Ancona, Italy, recently developed a new class of nanoparticles that have promising properties as drug carriers. They created nanoparticles from Phytantriol, a substance widely used in cosmetics, to load them with drugs. Phytantriol is an amphiphilic molecule, with one side soluble in water and one that is not. In the presence of water, the substance forms structures that minimise the contact with water of the insoluble side. The effect, taking place at the nanometric level, is comparable to oil forming droplets on the surface of a soup. In particular, Phytantriol forms nano-structures with intricate networks of aqueous channels, into which the commercial chemotherapy agent specifically used can be loaded and unloaded. To analyse the structure and the ability to take up drugs, the researchers used a combination of synchrotron SAXS, Infrared and UV spectroscopy. After having found a suitable formulation, they conducted laboratory tests on human breast cancer cells. The results showed a slightly higher efficacy of the anti-cancer drug in combination with the nanoparticles than without. These results are a promising step towards the development of new chemotherapy systems.


Michela Pisani

"We combined different techniques, which gave us useful insights about the structure of the Phytantriol nanoparticles, opening the possibility of using them for the development of new chemoteraphy systems."


Paola Astolfi

[2] *Lyotropic Liquid-Crystalline Nanosystems as Drug Delivery Agents for 5-Fluorouracil: Structure and Cytotoxicity,* Astolfi P., Giorgini E., Gambini V., Rossi B., Vaccari L., Vita F., Francescangeli O., Marchini C., Pisani M., Langmuir, 2017, 33 (43), pp 12369–12378, DOI: 10.1021/acs.langmuir.7b03173

Multi-method approach sheds light on the potential of plants to attenuate the metals load in natural water resources[3]

Extensive industrial mining often causes environmental problems. Many former mining sites around the world are heavily polluted with poisonous heavy metals, which make the areas dangerous to live in, often for decades. The last 25 years have seen a rise in the development of remediation technologies to make those polluted zones habitable again. However, the processes that heavy metals undergo over an extended time in a natural environment are complex and not yet completely understood. Especially the influence of the exchange between the geosphere - soil and water, and the biosphere - plants and organisms, is mainly unknown. Understanding of such interactions could lead to the further development of sustainable remediation techniques.

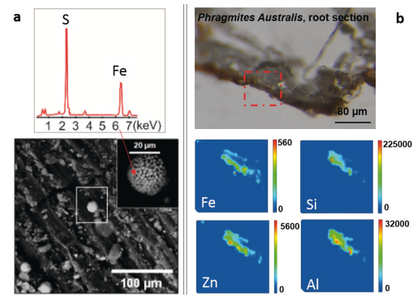


Figure 9
EDS analysis (top) and SEM image (bottom) of framboidal iron sulphide on the roots of Phragmites australis. b) Ordinary light stereo-microscope image (top) and LEXRF maps of Fe, Si, Zn and Al of Phragmites australis (bottom)

The research team around **Giovanni De Giudici** from the University of Cagliari, Italy, has taken up the challenge of understanding how plants influence the behaviour of heavy metals in polluted rivers, with a focus on the area of the Sardinian river, Rio San Giorgio, which was exposed to heavy lead and zinc mining for centuries, up to 20 years ago, and is therefore heavily polluted. De Giudici's study focuses on the hyporheic zone, i.e., the shallow shore of the river. Here the water flows slowly and the vegetation is dense, allowing maximum interaction between the water and the surrounding environment. The researchers took plant and soil samples from this zone at various points of the river to see how the pollutants are distributed.
To detect pollutants in the samples, they combined X-ray microscopy and X-ray absorption spectroscopy at the synchrotron beamlines in Trieste, which allowed them simultaneously to determine the concentration and chemical state of heavy metals in different parts of the soil and the plant, leading to conclusions about how much pollutant is filtered from the water, and in which composition it is stored in plants and soil.
The researchers created a map of pollutants found in the hyporheic zone of the river. A major part of those found in the water is oxidized and stored in plants' roots, although some of it is also found in the stem and leaves. The soil around the plants' roots also had a high concentration of the mineral, pyrite. This iron-containing mineral suggests that the plant influences the chemical environment and supports chemical processes that lead to the storage of poisonous heavy metals in non-poisonous minerals. This effect can lead to an apparent decrease in Zn load of up to 60%. When fully investigated, this process might open new ways of using plants as more effective filters and cleaners in polluted areas.


Giovanni De Giudici

"We wanted to observe the microscopic processes that rule the interaction between minerals and water, and between plants, microbes and minerals, to get more insights into the impact of mine waste as a source of pollution, and find new possible sustainable remediation techniques"

[3] *The role of natural biogeochemical barriers in limiting metal loadingto a stream affected by mine drainage,* De Giudici G., Pusceddu C., Medas D., Meneghini C., Gianoncelli A., Rimondi C., Podda F., Cidu R., Lattanzi P., Wanty R.B., Kimball B.A., Applied Geochemistry, 2017, 76, 124-131, DOI: 10.1016/j.apgeochem.2016.11.020

Scientists make graphene nano-ribbons shine[4]

The element silicon is the basis of almost all electronic applications in use today. It can be found in products ranging processors in personal computers to photovoltaic cells for the generation of green energy. However, five decades of intensive research and development have pushed silicon-based electronics to its limits and more and more research is dedicated to the development of new materials for the inevitable post-silicon electronics era. One-dimensional graphene nanoribbons (GNRs) are ideal candidates for materials eventually to replace silicon in electronic applications. GNRs, as their name suggests, are small strips of graphene single layers, usually with a width less than 50 nm. These nanoribbons show the same behaviour as classical silicon semi-conductors, but on a much smaller scale, which would allow, for example, smaller and faster processors to be produced. Despite the interesting electronic properties of GNRs, their photoluminescence, the ability to emit light, is fairly low. Photoluminescence is important for future electroluminescent devices (e.g., LED) based on GNRs rather than silicon.

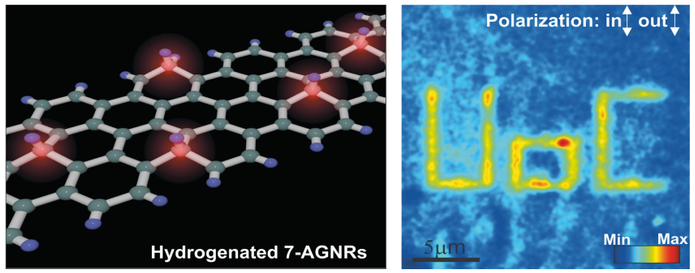


Figure 8
The image shows on the left a sketch of hydrogenated graphene nanoribbons (GNRs). The right part shows the writing of a photoluminescent pattern "UoC" by scanning a blue laser focus across a GNR film. "UoC" stands for "University of Cologne"

Research teams around **Prof. Alexander Grüneis** and **Prof. Klas Lindfors**, from the University of Cologne in Germany, have taken up the challenge of creating GNRs with higher photoluminescence. In a recent study, they developed a method for producing layers of specially designed GNRs on insulating carriers such as gold. They used a set of instruments, including CERIC's BaDElPh beamline at the Italian CERIC facility, Elettra Sincrotrone Trieste, to make a full photo-physical characterisation of these GNRs. On the basis of the obtained data, they discovered that they could enhance the photoluminescence of their GNRs by exposing them to strong blue laser irradiation. This method worked so well that it was possible to perform laser writing on the GNR layers. These important developments have set the stage for further exploration of the optical properties of GNRs and have opened the door to the design of new electronic devices.

[4]Senkovskiy L B. V., Pfeiffer M., Alavi S. K., Bliesener A., Zhu J., Michel S., Fedorov A. V. , German R., Hertel D., Haberer, D. Petaccia L., Fischer F. R., Meerholz K., van Loosdrecht P. H. M., Lindfors K. and Grüneis A., *Making Graphene Nanoribbons Photoluminescent, i*n Nano Letters, 2017, 17 (7), pp. 4029−4037, DOI: 10.1021/acs.nanolett.7b00147

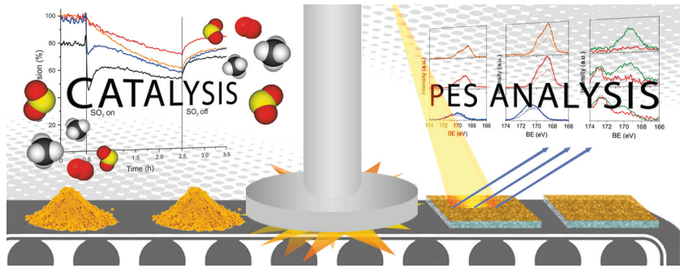

Alexander Grüneis

"Thanks to this study, we were able not only to make a fully photo-physical characterisation of GNRs, but also to enhance their photoluminescence and perform laser writing. Their optical properties give great chances for the design of new electronic devices"


Klas Lindfors

Novel catalysts against climate change and for cleaner cities[5]

The adoption of increasingly stringent regulations on automotive emissions is intended to protect citizens against polluted air and increase their life quality and health. These regulations are slowly causing a paradigm shift in policies, and car manufacturers are moving away from the classical combustion engine, to alternatives such as electric or hydrogen fuel-cell driven cars. While these concepts will be a long-term solution, in the short-medium term, a less polluting hydrocarbon fuel can be used. Natural Gas Vehicles (NGV) are a more efficient and cleaner alternative to gasoline and diesel propelled cars and they could be a suitable medium-term solution. Unfortunately, their exhaust gases contain significant amounts of methane (CH_4), a greenhouse gas 80 times as potent (over a 20-year time span) as carbon dioxide (CO_2), the best-known greenhouse gas. In order to make exhausts both cleaner and more climate-friendly, a method is needed to eliminate methane effectively.
A promising way of achieving this goal is to use catalysts based on palladium (Pd) nanoparticles, which promote the efficient oxidation of methane with oxygen into carbon dioxide and water. To allow the exploitation of this highly expensive metal, such catalysts have been designed to maximize the contact between the Pd nanoparticles and the promoter, which is composed of cerium-zirconium mixed oxides (CeO_2-ZrO_2) and is employed to promote the catalytic reaction. While the catalysts yield good results in the laboratory, many problems are still encountered under real life conditions. In particular, the so-called poisoning by sulphur compounds, which are ever-present in natural gas, is a problem for a long life of the catalysts. Under working temperatures, sulphur compounds are chemically bound to the Pd and the promoter material. This process could be irreversible and, over time, may suppress the catalytic performance.



To solve this problem, a team of researchers including **Tiziano Montini** and **Matteo Monai** from the University of Trieste conducted a study in which they compared the sulphur poisoning of several catalysts under realistic conditions. To determine the influence of sulphur on the catalysts, they used a combination of activity and stability tests performed on real powdered catalysts, and spectroscopic characterization performed on comparable model materials. They used a combination of highly sensitive surface electron spectroscopy (XPS) and advanced microscopic techniques available at CERIC, by which atoms can be made visible. The findings of the study show that sulphur binds directly on the Pd nanoparticles at lower temperatures, while at working temperatures higher than 500 °C the promoter material is affected by sulphates adsorption. The study suggests that of the promoter materials, pure ZrO_2 is the most easily regenerated after poisoning. These results are an important step towards the development of catalysts for real applications in cars with enhanced stability, to keep our air cleaner for longer.


Matteo Monai

"We wanted to compare the sulphur poisoning of several catalysts under realistic conditions. We combined XPS and microscopic techniques and observed that palladium supported on zirconium oxide is easily regenerated after poisoning, compared to cerium oxide-supported catalysts. This finding will allow developing better catalysits for applications in less polluting cars"

Figure 9
To study the effect of SO_2 poisoning on high surface area Pd@CeO_2-ZrO_2/Si-Al_2O_3 hierarchical catalysts, similar model catalysts suitable for Photo Emission Spectroscopy analysis were designed and prepared depositing pre-formed Pd@CeO_2-ZrO_2 units onto a conductive surface modified by a thin layer of Si-Al_2O_3 by Atomic Layer Deposition. The approach allowed detailed insights to be obtained into the evolution of the active phase and surface species during poisoning and regeneration.

[5]*The effect of sulfur dioxide on the activity of hierarchical Pd-based catalysts in methane combustion,* Monai M., Montini T., Melchionna M., Duchoň T., Kúš P.,Chen C., Tsud N., Nasi L., Prince K.C., Veltruská K., Matolín, V., Khader M., Gorte, R., Fornasiero P., in Applied Catalysis B: Environmental, 2017, 200, 72-83, doi:10.1016/j.apcatb.2016.09.016

Internal Research Projects

One of the main goals of CERIC is the integration of national multidisciplinary facilities into a unique EU-level distributed Research Infrastructure for the analysis and synthesis of materials and for sample preparation. After the publication of the 2016 Call for Research Grants, aimed at funding excellent multi-technique and multi-disciplinary research by using and eventually improving the research infrastructures in the CERIC Partner Facilities, three projects were funded in the same year: **CEROP** (Deciphering single-atom catalysis in Pt/ceria systems via advancing the CERIC operando methods), **Dyna Chiro** (Spectroscopy and Dynamics of Chiral Systems) and **RENEWALS** (Graphene for Water in Life Sciences). Their progress in the first year of implementation was positively evaluated by the International Scientific and Technical Advisory Committee - ISTAC of CERIC.

In January 2017, the ISTAC selected an additional project for funding: **MAG-ALCHEMI** - Magnetic Anisotropy Grafting by means of Atomic Level Chemical Engineering at Film Interfaces, submitted by principal investigator Dr. **Andrea Locatelli**.

One additional internal research project funded in 2017, in the framework of the 2016 Call for Research Grants.

Andrea Locatelli

Magnetic materials are the focus of MAG-ALCHEMI, which aims to develop tools to control thin film magnetism via interfacial engineering. The atomic-scale engineering of magnetic metamaterials is key to information technology and may lead to significant progress in developing the architecture and performance of various devices. Specifically, the project's goal is to devise novel means of tuning the magnetic state of the matter by appropriately modifying the interface chemistry. The project will address model systems of increasing complexity, starting from simple ferromagnetic layers combined with heavy metals and 2D materials such as graphene, allowing observation of several intriguing magnetic structures. The capacity to control the magnetic state locally will be a must throughout the project, which will be pursued with lithographic methods employing focused beams of photons, electrons or ions.

Four projects selected within the framework of the 2016 Call for Research Grants have been funded in the amount of up to 150.000 EUR/12 months, for a 3-year period. Funding is allocated by CERIC each fiscal year, subject to a positive outcome of the yearly progress evaluation made by CERIC in consultation with ISTAC. The overall contribution of MIUR for the above-mentioned projects amounts to € 1.750.530. The partners contributed in-kind a total amount of € 5.459.479.


Aden Hodzic

Another CERIC internal research project is "Nanoanalytics in Pharmaceutics", with Dr. **Aden Hodzic** as principal investigator. In the project, nano-analytical multi-techniques are used to develop drug formulations and release in solid, liquid-crystal and liquid states, enclosed in active pharmaceutical ingredients (APIs). The work is based on a methodology based on nano analytics, which predicts the dissolution and structural properties of tested drugs in a time range of minutes. Once applied, the research will impact the therapeutic performance of nano-systems.

Infrastructure's Evaluation and Upgrade

ISTAC evaluation of the CERIC's Austrian, Italian and Slovenian PFs

The CERIC Statute mandates ISTAC periodically to advise the General Assembly on the acceptance and continuation of the operation of the CERIC facilities. The purpose is to ensure the continuous high quality of the instruments and techniques of CERIC's offer. The first international periodic evaluation of the Austrian, Italian and Slovenian partner facilities (PFs) took place in May 2017, three years after the establishment of CERIC. After site visits in Trieste, Graz and Ljubljana, the evaluators positively assessed the technical and scientific capacity of the facilities and their role within CERIC.
At the **Austrian PF**, ISTAC members **Ingolf Lindau** (Stanford and Lund - synchrotrons), **Giorgio Paolucci** (Scientific Director of SESAME Synchrotron) **Zehra Sayers** (Sabancı University) and **Samar Hasnain** (University of Liverpool) evaluated the SAXS and Deep Lithography beamlines in Trieste, and the scattering facilities in Graz. Hands-on workshops for the user community were recommended, as well as funding for an immediate and medium-term upgrade to keep these facilities world leading.
At the **Italian PF**, the Committee commended the successful launch of a truly multi-technique approach to tackling new scientific problems, and fully endorsed the upgrade programme, Elettra 2.0. The visit included: Nanospectroscopy, Twinmic, Xpress, XAFS, SISSI bio, SISSI mat, MCX, GasPhase, SYRMEP, XRD1, Spectromicroscopy, SuperESCA, and ESCA Microscopy. It was led by ISTAC members **Christian Vettier** (former Scientific Director of ILL and of ESS-neutrons), **Luis Fonseca** (CSIC in Barcelona - nanoscience and nanomaterials), **Cecile Hebert** (EPFL - microscopy) and **Salvador Ferrer** (Associate Director of the Alba Synchrotron Light Source in Barcelona), and external experts **Jean Susini** (ESRF) and **Giorgio Margaritondo** (EPFL).
The visit to the **Slovenian PF**, which is the only one in CERIC with a strong focus on life sciences, covered SLONMR and was led by ISTAC members **Michel van der Rest** (former Director of synchrotron SOLEIL and former chair of ERF - life sciences), **Annalisa Pastore** (from MRC-UK - NMR) and external experts **Bruno Kieffer** (IGBMC) and **Jean-Pierre Simorre** (Grenoble IBS). Infrastructure upgrades, as well as wider user support were suggested, to increase competitiveness at the international level. The investments in infrastructure and personnel proposed by the PF were considered to be balanced and to address the needs of CERIC users.
ISTAC strongly recommended the organization of periodic user meetings for CERIC PFs, to stimulate collaboration and increase multi-disciplinary research among CERIC member countries.

CERIC call for Infrastructure's upgrade published in 2017

In order to develop further CERIC's instrumental capabilities, stimulate the development of CERIC's Research Infrastructure Roadmap and contribute to the integration of CERIC's facilities, the General Assembly approved investment in the CERIC Research Infrastructure. In order to implement such a decision, in 2017 the Consortium published an internal invitation to collect proposals from its Members for the development of instruments available in the PFs.
The foreseen amount of the investment is up to 2,000,000 EUR, optimally used to co-fund one proposal, although the possibility of co-funding several smaller ones is not excluded.
Collaborative proposals, bringing together two or more members, are preferred. In any case, the proposal should have a wider impact than on a single Partner Facility or Country. The infrastructure development may be proposed jointly with non-CERIC institutions.
The International Scientific and Technology Advisory Committee of CERIC (ISTAC) will be in charge of the assessment of proposals.

2

Training, Industrial Liaison, Communication, Projects

Main Achievements

1. **Educational projects**
Successful implementation of the 2nd edition of the training programme for high schools (PaGES 2), funded by the Italian Region Friuli Venezia Giulia.

2. **Training**
of PhD and post-doc students.

3. **Professional training and placement**
of CERIC's staff and managers

4. **Further development of the strategy for IL&TT**

5. **Adoption of the new CERIC visual identity and social media strategy**

6. **Organization of events**
to increase awareness of CERIC's services among both the scientific and the industrial community.

Training Activities

CERIC pays particular attention to skills development and exchange of know-how among pupils, scientists, administrative staff and managers. The promotion of training activities has been therefore widely supported by CERIC through the organization of and attendance at various schools, lectures, workshops, staff-exchanges and master programmes. Below is a list of some of the actions implemented in 2017.

PaGES 2 Project

The PaGES 2 project took 58 high school pupils from the Italian Region Friuli Venezia Giulia step by step through the stages of a scientific experiment, from planning, management, execution and evaluation of a research project, to disseminating its results. Starting from a research idea and a plan of the steps for its implementation, they carried out an experiment, and presented the projects' outcomes to the student community in their schools.
The project contributed to enhanced collaboration among schools in the region, to the development of the skills of participants and it helped them to make more conscious choices about their future studies and career.

Hercules School 2017

CERIC contributed to the HERCULES School - Higher European Course on the Use of Large Scale Experimental Facilities - by training 24 PhD students visiting the Italian Representing Entity of CERIC, Elettra Sincrotrone Trieste. **Primož Šket**, senior scientist at the Slovenian CERIC Partner Facility (PF) in Ljubljana, presented the features and potentials of NMR experiments complementary to Synchrotron and Neutron radiation, by giving an overview of the research conducted at the PF.
Matthias Girod, from CERIC, gave a tutorial about proposal writing for multi-technique experiments. Hands-on training was also offered at the Czech and Austrian beamlines (MSB and SAXS) in Trieste.

Training the users of tomorrow

The attraction of new users is crucial for the long-term sustainability of research infrastructures. With the ACCELERATE project, CERIC strategically increased its visibility by the establishment of outposts in regions of interest. The first achievement was that with the Uzhhorod National University. Seventeen scientists were trained in the instrumental and technical offer available in CERIC, and received useful information on proposal writing. The trainings equipped researchers to successfully apply for open access to CERIC and other European Research Infrastructures, as well as to function as ambassadors for the promotion of the research opportunities available in CERIC among their community. Another outreach action aiming at attracting new users from Albania, Belarus, Bosnia and Herzegovina, FYROM, Moldova, Montenegro, Serbia, Turkey and Ukraine, was organized within the framework of CONTACT (funded by the Central European Initiative) and H2020 ACCELERATE projects (read more on page 27).

Up-skilling of staff and training of RI managers

CERIC has been making continuous efforts towards training and capacity building its staff and managers, adopting a lifelong learning approach.
In particular, in 2017, the Consortium's Chief Administrative Officer, **Andrea Santelli**, was selected to attend the two-year Executive Master Degree in Management of RIs, organized by BBMRI-ERIC and the University of Milan Bicocca within the framework of the H2020 project RItrain.
CERIC also invested in the training of its Communications Officer, **Nicoletta Carboni**, through a one-month placement at the Policy and Communication Unit at the European Institute of Technology in Budapest, to upgrade her competences, mainly in the fields of corporate communications, events' managements, social media and media relations.
CERIC's Deputy Director, **Ornela De Giacomo**, was chosen to attend a Master Degree in RI Management in 2018. Staff exchanges between ERICs will also be implemented.

Industrial Liaison Activities

CERIC's strategy for Industrial Liaison & Technology Transfer (IL&TT) was further developed throughout 2017, within the framework of the H2020 ACCELERATE project, and will be further optimized and implemented in the coming years. One of the main activities in the field is focused on understanding market needs and carrying out actions to boost collaboration between CERIC's Partner Facilities and Industry.
An International Innovation Advisory Board (composed by Mateja Mesl, Ed Mitchella and Hana Kosova) was created to provide support in the definition of the CERIC's commercial access procedure and TT policies under development in the ACCELERATE project. The Board, which has expertise in the fields of business and intellectual property management in research institutions, is helping to review CERIC's procedures in industrial liaison and marketing the solutions offered.
Interviews with the scientists in charge of the instruments and laboratories in CERIC were carried out and will be used as a baseline for the preparation of targeted marketing material for different industrial sectors. To this aim, possible solutions for industry have been collected, organized both by instrument and by sector. Moreover, a database of companies categorized by sector, including mainly R&D and innovation managers, was created and is being constantly updated.
Capacity building remains a challenge for CERIC. The exchange of IL&TT best practices among its partners has been a continuous activity and has contributed to further strengthening the network.
Throughout the year, one-to-one meetings took place with a number of companies, to introduce them to CERIC and to the potential uses of the scientific and technical instruments and expertise available in the Consortium for industrial R&D activities.
In October, CERIC was the main organizer of a Research to Business event in Trieste, within the framework of ACCELERATE, which focused on the industrial applications of NMR (Nuclear Magnetic Resonance), Infrared (IR) and Nano IR, and Raman Spectroscopy. As demonstrated by the satisfaction survey, that followed the event, the ten attending companies were highly satisfied and had the chance to learn more and to discuss how to face their challenges in the development of their processes and products. This was further supported by the fact that several possible collaborations emerged from the event and are currently in the preliminary phase.
CERIC also intensified its participation in the European Analytical Research Infrastructure Village (EARIV) - a joint initiative led by a set of transnational and regional projects, such as ACCELERATE, SINE2020, EUCALL, CALIPSOplus, NFFA, Linx, BalticTram and NanoElec - by contributing to the EuroNanoForum 2017 in Malta, an international conference focused on nanotechnology and materials, connecting science with industry, policy-makers and citizens.
Networking activities were also carried out throughout the year, and strategic meetings took place with key actors of the industrial innovation ecosystem such as Renault, Sandvik and Toyota. As in the previous year, CERIC staff and managers attended a number of international events:

EARTO Innovation School
Brussels - Belgium
28 June 2017

11th ENISE Roundtable on open innovation and industry 4.0
Leon - Spain
23-24 October 2017

EUCALL Workshop: Innovation potential of advanced laser light sources
Sitges - Spain
14 November 2017

European Technology Transfer Offices Circle
Gothenburg - Sweden
30 November 2017

CALIPSOplus/SINE2020 1st Industry Officer Workshop and Networking
Sitges - Spain
15-16 November 2017

Communication and Dissemination

Adoption of the new CERIC visual identity and social media strategy

Following brainstorming sessions of the team of communication officers at CERIC and its partners with external experts in the fields of branding and communications, and following the advice of the CERIC Communication Guidelines published in 2016, the Consortium hired a professional agency for the design of a new corporate identity, including the logo and all printed and online visuals. On June 23rd, the proposal was officially approved by the General Assembly of the Consortium.
After the launch of the new visual identity, a social media strategy was drafted and adopted, which identifies the main channels and tools to be used, core target audiences and main topics to be addressed, based on a previous analysis of the interests of CERIC's target communities.

CERIC Science Picture Contest 2017

In 2017, CERIC launched an open call for photographic material, the CERIC Science Picture Contest, aiming to show the research environment and its results at the Partner Facilities distributed in CERIC Member Countries. Forty-seven applicants submitted 185 pictures. The best three were selected by CERIC staff and approved by the bodies of the Consortium. The selected authors each received a prize of 400 EUR after tax.

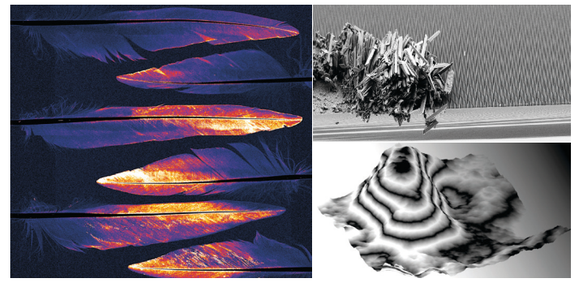


Figure 10
Winning pictures: "Light as a feather" by Alessandra Gianoncelli (left), "Welcome is Chaos" by Pietro Capaldo (top right) and "Nickel Zebra" by George Kourousias (bottom right).

Outreach Events

To increase awareness among the scientific community in its Member Countries and worldwide, about the research opportunities that it offers, CERIC was presented at a number of events across Europe, including:

NESY Winterschool 2017
Altaussee - Austria, 6 March 2017

11th Central European Training School on Neutron Techniques
Budapest - Hungary, 8-12 May 2017

GISR 2017, Italian Meeting on Raman Spectroscopies and Non Linear Optical Effects 2017
Trieste - Italy, 7-9 June 2017

19th Conference of Czech and Slovak Physicists
Prešov – Slovakia - 4-7 September 2017

24th International Conference on X-ray Optics and Microanalysis
Trieste - Italy, 25-29 September 2017

4th Workshop on Energy at Research Infrastructures
Magurele - Romania, 25 October 2017

Transnational Cooperation

Transnational cooperation is also implemented through CERIC's transnational projects. Three projects were running in 2017:

Horizon 2020 ACCELERATE project

The ACCELERATE project, with CERIC as coordinator, aims to support the long-term sustainability of large scale research infrastructures (RIs) through the development of policies and legal and administrative tools for more effective management and operation of RIs, with a particular focus on ERICs and CERIC.

In 2017, the following deliverables were achieved:

- Kick-off meeting
- ACCELERATE Communication Strategy and Plan.
- Launch of the project's key own electronic communication tools.
- Design and procurement of communication, promotion and marketing materials for the project.
- First draft of the Data Management Plan.
- Report on the State of Open Access Procedures at Research Infrastructures.
- Preparation of fast track open access.
- Report on the establishment of the CERIC Regional Outpost in Ukraine.

Horizon 2020 E-RIHS PP project

The European Research Infrastructure for Heritage Science Preparatory Phase project started in January 2017, coordinated by the Italian National Research Council. The E-RIHS PP partnership includes 16 countries (15 EU Member States plus Israel), 2 ERICs and 3 institutions representing scientific communities. E-RIHS PP also numbers 6 observers, and involves over 100 heritage science institutions worldwide.
It supports research on heritage interpretation, preservation, documentation and management by providing access to state-of-the-art infrastructure, data, tools and services to cross-disciplinary research communities. It also provides training in the use of these tools, public engagement, access to repositories for standardized data storage, analysis and interpretation.
E-RIHS has assembled a worldwide network of affiliated partners towards the creation of a global research infrastructure with the support of the intergovernmental organization ICCROM.
Fruitful discussions throughout the year focused on the future of the E-RIHS research infrastructure, on its future legal form, scientific vision, governance structure and financial planning, as well as on quality. E-RIHS has decided to become an ERIC, so the preparatory phase is focused on creating a solid base for the future operation of E-RIHS ERIC.

ACCELERATE-CEI CONTACT training on advanced materials characterisation in large-scale Research Infrastructures

Twenty-seven participants from 14 countries in Central and Eastern Europe attended the CONTACT workshop, held at the CERIC headquarters in Trieste on 26-27 June 2017.
The event was organized within the scope of CEI Cooperation Activities – part of the CEI Plan of Action 2016 priorities and was co-funded by the H2020 ACCELERATE project. It brought together researchers from Austria, Albania, Belarus, Bosnia and Herzegovina, Croatia, FYR of Macedonia, Georgia, Moldova, Montenegro, Serbia, Slovakia, Slovenia, Turkey and Ukraine, to familiarise them with the techniques available in CERIC for the analysis and synthesis of materials and biomaterials in large-scale facilities, and with the related open access procedures. One of the goals was to stimulate researchers from target countries to become active users in the future and increase their contribution to excellent science in the European Research Area, by presenting their research proposals at future calls for open access to large-scale research infrastructures such as CERIC.

Interreg Slovenia-Austria RETINA project

The project RETINA, opening research laboratories to innovative industrial applications, is funded within the Interreg programme Slovenia-Austria, Priority axis 1 - Strengthening cross border competitiveness, research and innovation. Coordinated by the University of Nova Gorica (Slovenia), it includes two CERIC Representing Entities among its partners: Graz University of Technology and the National Institute of Chemistry in Ljubljana. The project aims to foster access to research and innovation (R&I) infrastructures by companies in peripheral regions, especially in the field of advanced material engineering. RETINA addresses this challenge by building a network of established laboratories with complementary skills in materials science, and providing research centres and small, medium and large enterprises with a "single entry point" to access the network. This increases the chances of reaching the critical mass of R&I facilities in the area, stimulates companies to invest in R&I and, consequently, contributes to enhancing the competitiveness of less favoured regions. The project's main outputs will be informative events, laboratory visits, Pilot Actions performed in collaboration with industry and research centres, and feedback to public authorities, targeting different groups (scientific partners, knowledge transfer intermediaries, industries and decision makers) to maximize the impact.

3

Open for New Members

CERIC-ERIC is open to the accession of new members (Member States, Third Countries and Intergovernmental Organisations) that have at their disposal excellent analytical facilities or sample preparation capacities that can be used to develop and/or make available appropriate scientific and technical expertise and resources, and that apply an open-access policy. Enlargement would allow the main goals of CERIC to be advanced, to contribute to European top-level research and technological development, and to foster the integration of national multidisciplinary analytical, synthesis and sample preparation facilities into a unique infrastructure, open to researchers on a global scale.

Main Achievements

1. **One new member: Croatia, with the Ruđer Bošković Institute (RBI) in Zagreb**
2. **Appointment of FAMA as prospective Serbian Partner Facility in CERIC**

New Member - Croatia

In 2017, Croatia officially entered CERIC as a full member, with the approval of the General Assembly of the Consortium.
With this decision, the **Ruder Bošković Institute (RBI)** in Zagreb was appointed to be the Representing Entity of Croatia in CERIC, and the RBI Accelerator Laboratory to be the Croatian Partner Facility. RBI has therefore been formally empowered to offer its scientific and technical resources through the CERIC calls for open access, to international users selected by peer review.
The Institute, which had been favourably evaluated by the International Scientific and Technical Committee (ISTAC) of CERIC, has successfully participated in the scientific activities of the Consortium since its set-up in 2014, by offering its ion beam techniques for materials' modification and characterization to the CERIC users' community, in complementarity with the other techniques available in the other CERIC Partner Facilities.
The Croatian Ministry of Science and Education has designated **Dr. Tome Antičić**, State Secretary, and **Dr. Milko Jakšić**, Head of the Department of Experimental Physics at the RBI, as the Croatian delegates to the CERIC-ERIC General Assembly.

Prospective Members

In October 2017, the General Assembly of CERIC supported the **participation of the Serbian facility FAMA (FAcility for Modification and Analysis of materials with ion beams) in CERIC**, for a period of two years, during which the facility must develop all necessary procedures for an efficient user service to the international community. The facility, which had been previously evaluated by the CERIC International Scientific and Technical Advisory Committee – ISTAC, will work to allow open access through CERIC calls for proposals and will investigate the scientific opportunities that the cyclotron could offer.
The decision of the General Assembly of CERIC was taken after the Ministry of Education, Science and Technological Development proposed FAMA as its prospective Serbian Partner Facility.
The participation of Serbia in CERIC as a full member will then be considered once the ERIC Regulation has been officially adopted by the Serbian Government.
Applications for joining CERIC have come from a number of other institutions, from both Member and Non-member Countries, but they have not completed all the required steps to become a member.

The process that interested countries must go through to apply for full membership in CERIC follows the procedure outlined in the Methodology for Enlargement adopted in October 2016 by the General Assembly of CERIC, as shown in the scheme below:

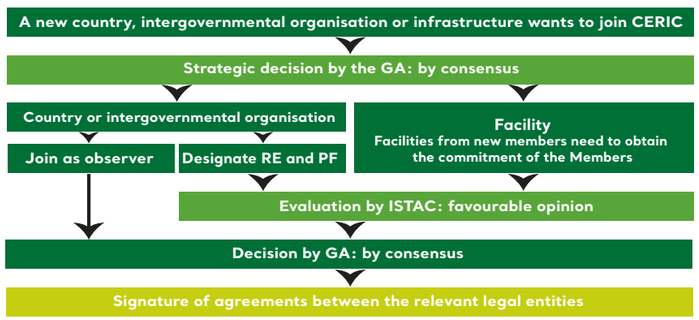


Figure 11 - Schematic representation of the procedure for expansion of CERIC

4

Management and Finance

Main Achievements

1. **Overview of funding sources mix**
(national, ESIF, H2020) from which CERIC could benefit

2. **Publication of the first version of the Data Management Plan**

3. **Procedure for fast-track access to CERIC**

4. **Further development of the ERIC legal framework**
by addressing common challenges on VAT exemption, HR and IKC

5. **Increasing the quality of support to scientific users**
by comparing open access procedures of 14 RIs and 11 H2020 projects

6. **Opening of two CERIC fiscal representations**
in Poland and the Czech Republic

7. **Financial and in-kind annual account**
for 2017 and estimation of the auditable values to be included in the Annual CERIC Account.

Monitoring Framework

Already in early 2016, the General Assembly of CERIC adopted its first monitoring framework, which enables continuous assessment aimed at providing early detailed information on the progress of activities. The results are used to:

- Assess the performance against the objectives.
- Improve outputs, outcomes and impact and
- Communication of successes, mitigation of risks.

The selected performance indicators respect the following criteria:

- Relevance – i.e., closely linked to the objectives to be achieved.
- Acceptability – e.g., by staff and stakeholders.
- Credibility for non-experts, unambiguous and easy to interpret.
- Easy to monitor - e.g., data collection should be possible at low cost and should not unnecessarily burden CERIC's Partner Facilities.
- Robustness – e.g., against manipulation.

The results have been reported annually to the General Assembly since its first full year in operation (2015). Headline indicators are reported in the Executive Summary of this document.

Bearing in mind that the monitoring framework should be a stable one, it was nevertheless already recognised when the first framework was proposed in 2016 that it would need some minor fine-tuning before reaching its final form. This part is addressed within the ACCELERATE project.

Development of a Methodology for the Evaluation of the Socio-Economic Impact of CERIC

"Periodical monitoring of societal impact should be a part of the regular assessment of Research Infrastructures"[1] . However, there is currently no unified framework for the impact assessment of investments in RIs. Within the ACCELERATE project, CERIC has been developing a socio-economic impact assessment framework, with the guidance and support of the experienced partner, the Rathenau Institute. In 2017, the first set of pathways and narratives through which the different RIs involved in the ACCELERATE project contribute to socio-economic development was identified. Work on the topic will continue until the end of the project in 2020. Since the beginning of 2018, the European Commission has also co-funded the project RI Impact Pathways, which aims to develop a model describing the socio-economic impact of research infrastructures and of their related financial investments. ACCELERATE intends to liaise with the project in order to align approaches to the impact assessment.

[1] *Sustainable European Research Infrastructures. A call for action*, European Commission SWD(2017) 323 final.

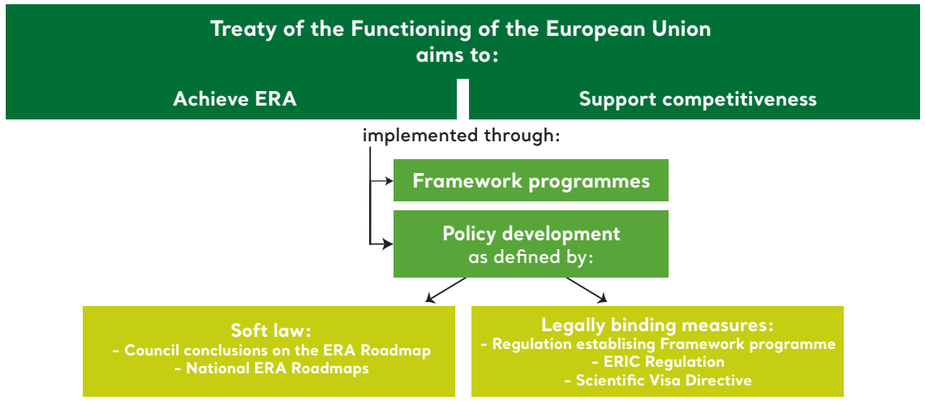
Synergies of Funding Sources
(ACCELERATE Deliverable 1.1)

In 2017, CERIC elaborated the variety of funding sources – national, H2020 and ESIF, and ways in which they can optimally and synergistically contribute to the future development of CERIC.
To address the topic, the intervention logic behind the support to research infrastructures on national, regional and EU levels, was reviewed, followed by identification of the funding opportunities.

Intervention logic

The intervention logic stems from the Treaty on the Functioning of the EU (TFEU), which defines research and technological development as an area of shared competence between Member States and the European Union (TFEU, Art. 4). This political agreement is implemented in practice through support to research and innovation activities within the Framework Programme, and policy coordination addressed by European Research Area (ERA) activities.

European legal and policy framework for the development of Science and Technology



In relation to research infrastructures, the shared competence between Member States (MS) and the Union is elaborated by the Horizon 2020 Regulation, which states that MS have a central role in developing and financing research infrastructures, while the Union plays an important part in supporting infrastructures at a European level, encouraging co-ordination of European research infrastructures. In the case of CERIC, this is practically demonstrated by the existing funding whereby, according to our Statute, the ordinary activities are supported by the Members or Representing Entities. Furthermore, the Commission's implementing decision setting up CERIC-ERIC (2014/392/EU) states that each CERIC-ERIC member should contribute in kind by operating, making available and continuously upgrading one Partner Facility, for a total investment value exceeding EUR 100 million and a total annual operation cost exceeding EUR 10 million.
While capital investments and operational costs are covered by the MS, the H2020 project ACCELERATE, co-funded by the European Commission, supports CERIC's long-term sustainability through the development of policies and legal and administrative tools for more effective management and operation of RIs.
In addition to the national and H2020 funds, research and innovation is also co-funded by another EU programme - the European Structural and Investment Fund (ESIF), albeit the objective is not to strengthen the scientific and technological bases of the EU but economic and social cohesion, as defined in the 1986 Single European Act.
Research infrastructures such as CERIC can thus be funded from various sources, whether national, ESIF or H2020, depending on the characteristics of the funds.

Activity	Funding
Development of instructure	ESIF, National
Open Access	National, H2020 (mainly for pilot activities)
Training of scientific and technical personnel	National, H2020, ESIF
Strategy and policy development	H2020, ESIF
Coordination of activities, including promotion, outreach and marketing activities, other operational costs	National
Joint RD activities	H2020, ESIF, National (in-kind and central)

Table 2 - Potential funding sources for CERIC-ERIC

In addition to supporting research and innovation activities within the Framework Programme, policy coordination addressed by the European Research Area (ERA) activities also plays an important role in the sustainability of research infrastructures. Of particular importance here are national ERA and Research Infrastructure roadmaps. Especially the latter can result in systematic support to the activities of the prioritised infrastructure, whether from national or ESIF funds. To this end, in 2017 CERIC reviewed its prioritisation on the national level in its members, by the ERA Roadmap, Research Infrastructure Roadmap or Operational Programmes, describing the priorities of regions for ESIF investments. It is important to note that, apart from CERIC Member Countries, which published their Research Infrastructure Roadmaps before or in the year that CERIC was established, in July 2014 (AT, PL), and Hungary, which has not yet published its roadmap, all Members have included CERIC among their funding priorities in their roadmaps. In 2017, Czech and Slovenian PFs received support through national competitive calls for international research infrastructures, which in the case of the Czech Republic was mainly funded through ESIF funds.
In conclusion, national, ESIF and Framework Programme sources currently support the activities of CERIC. Their mix, based on the properties of a particular funding source, are important for the long-term sustainability of RIs.

Data Management Plan

By joining the ACCELERATE project which started in January 2017, CERIC entered the Open Research Data Pilot (ORDP), launched as required by the European Commission for Horizon 2020 funded projects. The first version of the Data Management Plan (DMP) was published in 2017. DMP is a living document, which is constantly updated throughout the project's lifetime as new developments and procedures are implemented, and will be used as the baseline for the future development of CERIC's own DMP. In its first version, the DMP provides an analysis of the main elements of the data management policy that will be used by the Consortium with regard to all datasets generated by the project.
ACCELERATE will produce two main types of data: organizational and scientific/technical. With reference to the latter, the two open access pilots taking place in the framework of the project, in which three CERIC Partner Facilities are involved, will be the starting point for developing a harmonized policy establishing how and by whom data will be managed after the performance of scientific experiments, in order to monitor compliance with the EC Open Research Data Pilot.
In relation to metadata (data-level, project-level and repository-level), a detailed overview over the metadata structure of each Partner Facility will be given in the second version of the document. In the final DMP, a plan for short-term and long-term preservation will also be set.
Finally, the DMP gives an overview of possible solutions for a common data storage system. These include both European initiatives on data management (such as EOSC, EGI, EUDAT) and national initiatives from CERIC members such as the Open Data Portal Slovenia or the Open Access Network Austria.

Open Access to Data

Further to enable open access to data, the General Assembly of CERIC approved the commitment of the Consortium to contribute to the implementation of the European Open Science Cloud (EOSC) and the European Data Infrastructure under the FAIR principles. The budget of a potential INFRAEOSC-04 project will be used to help CERIC implement these principles and link up to the EOSC[2].

Open Access Procedures

One of the most important elements contributing to the long-term sustainability of Research Infrastructures (RIs) is ensuring excellent science. The quality of user support here plays a key role. With this in mind, CERIC took a deeper look at how open access procedures are organised and carried out by various Research Infrastructures. Fourteen RIs and eleven H2020 projects were taken into account, identifying a set of good practices and potentials for improvement:

- Setting up a unified portal with a centralised review panel. In the case of CERIC, there is one review panel that selects successful proposals, which are then scheduled in the Partner Facilities according to the time commitment declared for the year.
- Sending back proposals to users for revision after first evaluation by the scientific committee.
- Providing the necessary training and information to users.
- Developing generalized and integrated user registration, harmonized proposal forms and templates, a web-based proposal peer review process and platforms for cross-source independent beamline access.
- Harmonizing access rules, taking into account the different requirements of each facility.
- Centralizing the review panel for evaluation.
- In some cases, depending on the feasibility, developing a specific access procedure for particular experiments (long-term ones/fast track/etc.).
- Splitting up the evaluation procedure between technical (feasibility of the project) and scientific.
- Elaborating evaluation criteria to fit the objectives. Different RIs choose criteria such as innovation, quality of research, relevance, level of potential contribution to an active field of science. Aspects such as collaboration with industry, promoting young and/or new users, outreach to new communities, may also be taken into account as criteria for evaluation.

A summary of Open Access Procedures adopted in different RIs has been produced within the framework of the ACCELERATE project. At CERIC, the Open Access Procedure is divided into two steps to give users the chance to make necessary changes and adaptations based on the comments given. Most facilities have similar procedures and the main differences are in the evaluation criteria. Moreover, RIs aim to adapt to users' needs and are flexible in incorporating new procedures that benefit them.

[2] "By federating existing scientific data infrastructures and cloud-based services, the EOSC will address the fragmentation of e-services and will provide seamless access to and preservation of data, as well as services for connectivity, computing, data storage and management, among others. The EOSC will facilitate access to FAIR data by fostering data management, discoverability and reuse across all research disciplines; it will help develop specifications for interoperability and data sharing across disciplines and infrastructures, thus contributing to the reusability and interoperability of diverse types of data", in *Sustainable European Research Infrastructures. A call for action*, European Commission SWD(2017) 323 final.

Preparation of Fast-Track Access

Fast track open access is the new fast route to CERIC's instruments. It allows researchers to access a set of instruments with a short waiting time (max 1 month) for short measurements (max 48 hours). This is possible through a shortened evaluation process. Fast track access answers the need to perform quick and short measurements in special cases. Applying to regular calls requires a deep and profound experimental planning over a long period of time. On average, the process – from submission to scientific excellence evaluation and scheduling – takes three months, and the subsequent scheduling takes place within a six-month period. This procedure is very well established and successful for long and complex experiments. However, researchers sometimes need quick access to certain instrumentation. The reason may be to not perform the experiment itself, but rather to do a feasibility study to see whether the chosen technique gives the results required. Another reason might be the verification of prior results for publication or a new proposal.
CERIC has introduced the technical procedure behind fast track open access, and outlined the instruments available for this option, and the eligibility criteria to be fulfilled for this type of access mode.

Human Resources

CERIC has implemented transparent and merit-based recruitment policies. Jobs announcements are published on all CERIC's media channels, as well as on well-known online platforms with international outreach, such as Euraxess and EurActiv.
In addition, i**n 2017, CERIC established fiscal representations in Poland and the Czech Republic**. These have allowed CERIC to hire scientific and technical personnel in these countries, within the framework of three-year internal research projects jointly funded through CERIC by the Italian Ministry of Education, University and Research, and by the involved Representing Entities.
CERIC has widely and actively contributed to the discussion on Human Resources issues, including international staff mobility, taxation, social security, labour law and pension schemes, with a constant dedication to the development of its human capital.
With reference to gender balance in the composition of CERIC staff, CERIC is compliant with the recommendations of the European Charter for Access, by which "Employers and/or funders should aim for a representative gender balance at all levels of staff, including at supervisory and managerial levels [...]". In 2017, 53% of CERIC employees were women.
Such a balance also stands out in the figures related to the CERIC principal investigators, among which 36% were women in 2017.
The CERIC staff, as of 31 December 2017, is composed of 19 people, and has increased by 6 employees during 2017. Among them, two were hired in the frame of the H2020 ACCELERATE project, and four are researchers hired in the frame of the CERIC internal research projects.
The staff distributed in the PFs and working in-kind for CERIC amounted to 274 people including researchers, PhD students, technicians, managers and administrators.

Contribution to the Development of the ERIC Legal Framework

Following the trend of previous years, several activities have been carried out by CERIC to address challenges that are common to all ERICs, towards the clarification of questions peculiar to the ERIC framework, namely in the fields of VAT exemption, in-kind contributions, mobility of personnel etc., and the related development of harmonized practices and procedures.

- In May 2017, a Memorandum of Understanding (MoU) was signed by all constituted ERICs, for the establishment of the **ERIC Forum**, aimed at further intensifying collaboration among them. In particular, its objectives are to identify and develop collective responses to common challenges, contribute to the further development of the ERIC Regulation and ESFRI Framework, as well as to the European and international research context, and to foster the visibility, impact and sustainability of ERICs.

- The ACCELERATE project has provided a fruitful environment for exchanging questions, knowledge and best practices in the field of Human Resources in ERICs. **Two workshops** – one of which was co-funded by the Italian Ministry of Education, University and Research, MIUR – were organized in 2017 on the topic, **with a focus on HR management** and the most difficult aspects of their regulations in an intergovernmental framework such as that of ERICs. ERICs' managers and external experts have stimulated discussion on existing problems in this area from the legal and financial points of view, to find possible viable solutions, including as a result of the exchange of participants' experiences on the subject. Critical issues related to the mobility of staff of research institutions, to compulsory and complementary pensions, contracts and health care, and the related economic issues, were discussed, based on the answers that participants provided to a questionnaire that had been previously circulated among them to identify the most relevant and critical topics they face in their ERIC.

- **VAT issues** have also been the focus of a specific task in the ACCELERATE project, which aims to develop common policies and methodologies to manage the operation of ERICs efficiently. With reference to VAT/excise duty exemption, the goal is to obtain a "general" VAT exemption based on ERIC status, to avoid sending a request for exemption anytime a supply occurs. In order to do so, the next step will consist of mapping the procedures in force in the different EU countries to implement VAT exemption for the ERICs and their Representing Entities. In Italy, CERIC has succeeded in obtaining an extension to the Representing Entity, of the possibility of making purchases VAT exempted on the basis of the same conditions set out for the ERIC.
- CERIC has properly implemented the methodology for collecting, reporting and accounting **in-kind contributions** – which was developed in 2015-2016 – and will take a step forwards in its optimization and simplification in the coming years, with the final goal of defining a procedure that can be ratified and sanctioned for use by the EC.

Accounting Methodology

The General Assembly of CERIC approved and adopted the new Methodology for Accounting In-Kind Contributions in 2016, which has been implemented for the collection of data from the Seat and the PFs for 2017, and used as a baseline for the preparation of the Notes to the Financial Statements as at December 31, 2017. In 2017, a new proposal of the methodology was further discussed by the Board of Directors of CERIC, with the goal of simplifying the accounting process and of introducing the possibility of accounting for access costs. The new version will be submitted to the GA in 2018 for it to consider its adoption and application for the accounts of the same year.

Financial Statements 2017

Balance Sheet - Assets and Liabilities		
	2017	**2016**
ASSETS	**3.194.281,30**	**1.942.050,29**
Non-current Assets	**131.790,31**	8.381,36
Plant, property and equipment	116.721, 39	7.489,88
Intangile assets	15.068,92	891,48
Start	-	-
Investments in associates	-	-
Current Assets	**3.062.490,99**	**1.933.668,93**
Inventories	-	-
Long-term credits	-	-
Short-term credits	34.926,28	-
Credits for in-kind contributions	-	-
Other current credits and receivables	-	-
Cash and cash equivalents	3.014.560,28	1.907.039,24
Prepayments and accrued income	13.004,43	8.019,36
EQUITY AND LIABILITIES	**3.194.281,30**	**1.942.050,29**
Equity	**-**	**-**
Equity	-	-
Capital and other permanent contributions from Members	-	-
Reserves	-	-
Accumulated profits	-	-
Non-current Liabilities	**601.348,62**	**567.050,35**
Long-term financial debts and loans	-	-
Other long-term debts and liabilities	-	-
Advance payments for externally funded projects	550.887,86	545.603,70
Pensions funds and other benefits for compensation employment	50,460,76	21.446,65
Long-term provisions	-	-
Current Liabilities	**2.592.932,68**	**1.374.999,94**
Short-term financial debts	-	-
Other short-term debts and liabilities	299.692,43	680.623,27
Advance payments for externally funded projects	14.455,08	0,00
Debts for contributions in-kind	-	-
Other current payables	69.759,48	26.158,81
Short-term funds	-	-
Deferred income and accrued expenses	2.209.025,69	668.217,86

Profit and loss account			
		2017	2016
Revenues		**1.487.370,57**	**1.085.607,46**
	National and international Grants and contributions	1.487.187,12	1.085.607,46
	Contributions in-kind	-	-
Other revenues	Other revenues	183,45	-
Operating costs		**1.444.597,57**	**1.057.247,88**
	Costs for raw materials, supplies and goods	31.683,48	7.055,73
	Costs for raw materials, supplies and goods available in-kind	-	-
	Costs for services	417.406,81	382.477,00
	Costs for services available in-kind	-	-
	Staff costs	991.909,68	667.715,15
	Staff costs disposable in-kind	-	-
	Costs of rents, concessions and royalties for trademarks	-	-
	Costs of rents, concessions and royalties for trademarks available in-kind	-	-
Other operating costs	Costs for institutional activities	3.597,60	2.589,41
Ebitda (Earning before Interests, Taxes, Depreciations and Amortizations)		**42.773,00**	**25.770,17**
Depreciation		12.841,96	2.107,49
Write-downs for impairment of tangible and intangible assets		-	-
Ebit (Earnings before interests and taxes)		**29.931,04**	**23.662,68**
Financial income and expenses		**-306,04**	**175,32**
	Financial income	130,22	175,32
	Financial charges	-436,26	-
Income from investments		-	-
Value adjustments to financial assets		-	-
Result before tax		**29.625,00**	**23.838,00**
Income tax		29.625,00	23.838,00
Result for the year		-	-

Notes to the Financial Statements as at December 31, 2017

Accounting Criteria

These annual Financial Statements have been compiled in conformity with the IPSAS (International Public Sector Accounting Standards) international accounting standards issued by the International Public Sector Accounting Standard Board (IPSASB), and in process of being adopted by the European Commission within the meaning of Council Directive No 2011/85/EU of 8 November 2011 on requirements for budgetary frameworks of the Member States.
The decision voluntarily to adopt an accounting system that can be connected to international principles is consistent with the process of harmonization started some time ago within the EU Commission, but not yet completed. For this purpose, it is relevant to recall the “Report from the Commission to the Council and the European Parliament towards implementing harmonised public sector accounting standards in Member States. The suitability of IPSAS for the Member States”, published on March 2013.
The IPSAS can in general function as a basis for a harmonised accrual-bases accounting standard passing through its transformation into EPSAS (European Public Sector Accounting Standards). The aforementioned EU Directive states that “by 14 December 2018 the Commission shall make public a review of the sustainability of the Directive (see art.16).
CERIC is set up as an international organization with scopes of general interest typical of an entity referable to the Public Sector. Therefore, CERIC should therefore be able to relate to its Members in different countries in a common language. This should be adopted in all matters and at all levels and thus also in the model of presentation of economic-financial topics that support annual accounts and budgets.
The use of the international accounting standards referable to the public sector, taking into account the specific character and scopes of CERIC, adequately conforming to the legal characteristics of the entity and to its functions and scope, allows the development of well-defined best practices, the impact of which on the financial aspects is measurable and effective. The use of international accounting standards, in fact for the public sector, allows information on the financial statements to be presented in a common way for users/stakeholders of different nationalities.

It is possible in this way to ensure that:

- The information is relevant, reliable, comparable and understandable;
- The terminology used is common, appropriate and explanatory among Members and for similar international organisations outside Europe;
- The financial statements are auditable by the International Standard of Audit by auditors from different nations;
- A host country change - and thus any site change - is not relevant for the comparability of information and models, books and records of the accounting system;

The system is able to present the in-kind contribution model, and to provide analytical accounting for projects and separate accounting for economic activities.

The aim of the annual financial statements is to provide information on the assets and liabilities, the profit or loss and changes in the financial structure of the Consortium, useful to a wide range of users. The financial statements are prepared within a general-purpose framework.

The financial statements have been compiled in accordance with the principles of clarity and transparency and provide a correct and exhaustive framework of information on property relations as well as economic and financial relations implemented by the Consortium in carrying out its activities.
It has been compiled taking into account international accounting standards, integrated in order to be consistent with the legal and effective structure of CERIC.
Of the various options allowed by IPSAS 1, the Consortium has chosen to present the layout of the balance sheet distinguishing between current and non-current items and the layout of the profit and loss account classifying the expenses by nature.

In its drawing-up, the following principles have been observed:

- The items have been evaluated prudently, taking into account the perspective of the continuity of the activities, as well as the economic function of an asset or liability;
- Only incomes and expenditures related to the financial year have been accounted, independently of the day of encashment or payment, under the accrual accounting principles;
- The risks and losses related to the financial year have been accounted for, even if known after the end of the financial year.

These Notes have been compiled with the aim of clarifying, completing and analysing the information contained in the balance sheet and in the profit and loss account, in addition to providing information on the applied evaluation criteria, on movements that have taken place, and changes in various assets and liabilities.
The explanatory notes are an integral part of the following documents, to present these financial statements and provide descriptive and schematic information with particular reference to the property aspects, as well as economic and financial aspects of the overall management.

The financial statements comprise the following parts:

- Balance sheet
- Profit and loss account
- Explanatory notes
- Management report
- Comparison between budget and annual account
- Cash Flow Statement
- Net financial position – trend for the period January – December 2017

Evaluation Criteria

The financial statements have been compiled in accordance with the principles of clarity and transparency and provide a correct and exhaustive framework of information on property relations, as well as economic and financial relations implemented by the Consortium in carrying out its activities.

Balance Sheet

Items in the balance sheet are classified into/distinguished as non-current/current.

Assets

Assets have been classified as current assets when:

- They have been realized during the normal operating cycle of the institution;
- They are cash or equivalent complement not restricted in its use.

Assets realizable within the operating cycle have been classified as current, regardless of whether they have actually been realized within 12 months from the balance sheet date.

Non-current assets include tangible assets (computers and other minor electronic tools), intangible assets (licenses and in general all assets not related to the operating cycle and realizable after 12 months from the balance sheet date).

Liabilities

Liabilities have been considered current liabilities when:

a) they are extinct in the course of the normal operating cycle of the institution;
b) extinction is due within 12 months from the balance sheet date.

Other liabilities, i.e., those not related to the operating cycle and all other institutional liabilities, are classified as current if their extinction is due within 12 months from the balance sheet date.
Otherwise, they are recognized as non-current liabilities.

Deferred Incomes and Accrual Expenses

This item includes the amount of funds received for 2017 and not yet fully used by 31.12.2017 for the purposes for which they were intended. They will therefore be used in coming years, for the same purposes. This item represents the carry-over for balances of the subsequent year to that under review. In this regard, the Consortium is obliged to operate in future years in fulfilment of the mandate required by the Ministry of Education, University and Scientific Research, who assigned the financial funds (FOE) under which CERIC activities were carried out in 2017.

In-kind Contributions

Contributions in-kind will be included in the financial statements on the basis of the details contained in the document entitled " Methodology for Defining the Values Involved in CERIC-ERIC Activities, and to Detail In-kind Contributions", under the conditions specified therein and only as a result of auditing carried out by local auditors, which will be compared with the auditors of CERIC.

Profit and Loss Account

The drawing-up of the profit and loss account is regulated by the IPSAS, integrated and conformed to be consistent with the characteristics and scopes of CERIC-ERIC.

Incomes

Incomes are increases of benefits connected to the administrative year.

Costs/Expenses

Costs/expenses are decreases of economic benefits of the administrative year. The analysis of costs has been explained in the overview of profit and loss account using a classification based on their nature.

In-kind Contributions

In-kind non-monetary contributions will be distinguished (when realized) between:

1) Those strictly related to the cost of the production factors (exhausting their utilities during the ordinary cycle).
2) Those strictly related to covering investments (in intangible and tangible assets).

Assets
Non-current Assets
Tangible Assets

Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
7.489,88	116.721,39	109.231,51

The following flow chart shows the change in individual items, summarized in the present note.

Description	Property	Technical furniture	Electronic office machines	Office furniture	Mobile phone	Advances for the supply of durable equipment	Total
Balance as at 31/12/2016	**0,00**	**291,91**	**5.760,46**	**-**	**1.437,51**	**-**	**7.489,88**
Acquisitions during the year	0,00	76.355,49	9.057,19	23.580,78	389,00	12.200,00	121,582.46
Depreciation for the year	0,00	7.677,73	2.486,81	1.768,57	417,84	-	12.350,95
Balance as at 31/12/2017	0,00	**68.969,67**	**12.330,84**	**21.812,21**	**1.408,67**	**12.200,00**	**116.721,39**

Intangible Assets

Balance as at 31/12/2016	Balance as at 31/12/2017	Difference
891,48	15.068,92	14.177,44

Historical costs at 31/12/2016 are as follows:

Description	Balance as at 31/12/2016	Operating increments	Operating decreases	Depreciation for the year	Value on 31/12/2017
Concessions, licenses, trademarks	891,48	991,18	0	491.01	1.391,65
Intangible assets in progress	0,00	13.677,27	-	-	13.677,27
Total	**891,48**	**14.668,45**	**0**	**491,01**	**15.068,92**

Current Assets

Short-term Credits

The balance is divided according to the deadlines of the credits:

Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
18.610,33	34.926,28	16.315,95

The composition of the amount as at 31/12/2017 is as follows:

Description	Within 12 months	Over 12 months	Over 5 years	Total
Advances to suppliers	7.608,54	0	0	7.608,54
Other receivables	2.507,89	0	0	2.507,89
Tax advances	23.838,00	0	0	23.838,00
Credit notes to be received	971,85	0	0	971,85
Total	**34.926,28**	**0**	**0**	**34.926,28**

The balance sheet item "Advances to suppliers" represents part of the expenses charged by suppliers for activities that will be implemented at the beginning of 2018.

Cash and Cash Equivalents

The balance represents cash at the bank and in hand at the end of the financial year. It represents liquid assets and cash equivalents at the end of the year.

Cash deposited at the bank Unicredit Banca Spa.

Description	Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
Bank deposits	1.907.039,24	3.014.560,28	1.107.521,04

In this context, the Consortium is in a credit position towards the Institute Unicredit, Agency of Trieste, where it has opened a current account for financial management. According to the Collaboration Framework Agreement signed in July 2017 with the Italian Representing Entity, Elettra-Sincrotrone Trieste S.c.p.A., a sum of € 2.645.835,00 was delivered to this account by the Ministry of Education, University and Scientific Research through AREA di Ricerca of Trieste in December 2017, to support the Consortium's activities for the year reviewed. The Agreement specifies the respective activities and finances for the period 2017-2019. Its main goal is to strengthen and integrate the CERIC distributed management and research activities.

In January 2017, CERIC-ERIC received an amount of € 301.528,35, the second part of the advance payment from the EU for the ACCELERATE project.
In July 2017, CERIC-ERIC received from the EU an advance payment for the H2020 E-RIHS project, in the amount of € 60.000,00.

Prepayments and Accrued Income

Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
8.019,36	13.004,43	4.985,0

These items measure income and expenses whose competence is advanced or delayed with respect to cash or documentary; they disregard the date of payment or collection of related income and expenses common to two or more years and distributable upon time. This amount represents prepaid expenses related to costs for annual insurances, to be referred, on accrual basis, to 2018.

Equity and Liabilities

Equity

Capital and other Permanent Contributions from Members

Reserves

Accumulated Profits

No values are entered for these items

Non-current Liabilities

Other Long-term Debts and Liabilities

Advance Payments received for externally funded projects

The item "Advance payments for externally funded projects" includes

- The first part of advance payments related to the ACCELERATE Project, funded by the EU (€545.603,70) accounted in 2016. The project has a duration of 48 months and will finish in December 2020. CERIC is acting as coordinator. The advance payment received is related to the implementation of the activities described in the project, and it must be returned only if CERIC does not carry out the project, or if is does not comply with the contractual obligations towards the EU.
- The second part of advance payments related to the ACCELERATE Project (€ 301.528,35).
- The advance payment related to the Project E-RIHS, funded by the EU (€ 60.000). The project has a duration of 36 months and will finish in December 2019. CERIC is acting as project partner.

The final amount at 31/12/2017 has been reduced on the basis of the progress reports of the projects ACCELERATE and E-RIHS, calculated with reference to the incurred costs for the period Jan. - Dec. 2017 (€ 356.244,19).

Considering that only a reasonable estimation of the advances referred to the activities that will be carried out in the next 12 months can be done, there is not the possibility to split the total amount between the non-current part and current part.

Description	Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
Advances	545.603,70	550.887,86	5.284,16

Pensions Fund and Other Benefits for Compensation Employment

Severance indemnities for employees.

Description	Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
Severance indemnities for employees	21.446,65	50.460,76	29.014,11

The item is made up as follows:

Description	Initial value 31/12/2016	Plan balance 2016	Substitutive tax	Paid to investments units	Severances paid during the year	End value 31/12/2017
Severance indemnities employees	21.446,65	30.929,11	0	1.915,00	0,00	50.460,76

The severance set aside figure represents the actual debt of the Consortium 31/12/2017 to employees in force at that date.
As at 31/12/2017, advances have not been required by employees.

Current Liabilities

Other Short-term Debts and Liabilities

Debts

The composition of the aforementiond amounts is as follows:

Description	Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
Account payables	81.240,58	168.778,89	87.538,31
Tax liabilities	61.123,32	82.616,39	21.493,07
Payables to social security institutions	33.570,27	48.297,15	14.726,88
Payables for projects	489.689,10	-	489.689,10
Total	**665.623,27**	**299.692,43**	**365.930,84**

Balance at 31/12/2016	Balance at 31/12/2017	Variation
665.623,27	299.692,43	365.930,84

Debts are valued at their nominal value.

The item “Account payables” (€ 168.778,89) includes debts to third parties, mainly related to services purchased on credit. This item appears on the company's balance sheet as a current liability, since the expectation is that the liability will be met in less than a year.

The item "Tax payables" includes liabilities for specific taxes and is composed of withheld taxes for employees and associates and collaborators for € 47.916,39, for VAT to be paid in 2018 for € 5.075,00, for taxes due by the Consortium (€ 29.625,00). With reference to the last amount, an advance payment was made in 2017 for the total amount of € 23.838,00. This amount is included in the current assets of the Balance Sheets.

"Payables due to social security institutions" includes the amount of social security contributions relating to employees, accrued but not paid as at 31 December 2017, for an amount of € 48.297,15.

"Other payables" includes remaining debts, which by nature cannot be described above, including amounts due by CERIC to staff for all liabilities accrued to them, in accordance with current legislation and Personnel Regulations, including the value of accrued vacation pay at the time of reporting. This account at 31/12/2017 was as follows:

Description	Amount
Payables to employees for holidays and leave not taken	33.191,99
Other payables to employees	3.325,18
Payables to body	25.000,00
Other debts of a different nature	8.242,31
Total	**69.759,48**

The item "Payables to bodies" is related to the fee due by the Consortium to an internal auditor. Debts are evaluated at their nominal value. "Debts to providers" are stated net of possible trade discounts.

Description	Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
Other payables	26.158,81	69.759,48	43.600,67

Advances

The item "Advances" includes advance payments related to the project PaGES3 - Planning, Management and Implementation of a Scientific Experiment in an International Research Infrastructure – funded by the Region Friuli Venezia Giulia for Euro 15,000.00, as the second edition of the project PAGES presented in 2015. The amount of the contribution has been reduced by the costs incurred in 2017 that will be claimed to the funding agency (544,92 euro).
The advance payment received at the end of 2016, referring to the first edition of the Project PAGES, was reported to Region Friuli Venezia Giulia in September 2017, after the conclusion of the project activities.

Description	31/12/2016	31/12/2017	Variation
Advances	15,000.00	14.455,08	544,92
Total	**15.000,00**	**14.455,08**	**544,92**

Deferred Income and Accrued Expenses

These items are related to the period calculated on an accrual basis.

Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
668.217,86	2.209.025,69	1.540.807,83

The item breaks down as follows:

Description	Amount
Deferred income	2.209.025,69
Accrued expenses	0,00

The balance sheet item "Deferred income" measures the portion of the contribution funded by the Italian MIUR for the financial year 2017 for the activities of the CERIC statutory seat, deferred to 2018.

The amount of € 2.209.025,69 is derived as follows:

Category	Carry over of 2016	Italian Contribution (FOE 2017)	Consortium expenses for 2017 covered by FOE	Carry over for 2018
Deferred income	668.217,86	2.645.835,00	1.105.027,17	2.209.025,69

Income Statement

Revenues

Revenue items primarily identify the portion of the contribution for the financial year allocated by Italy through the public company Area di Ricerca for the Consortium's activities to cover the expenses of management:

Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
1.085.607,46	1.487.370,57	401.763,11

The composition of the amount at 31/12/2017 is as follows:

Category	31/12/2016	31/12/2017	Variation
MIUR ordinary contribution	1.063.800,00	1.105.027,17	41.227,17
MIUR contribution for activity of dissemination and training	6.323,46	2.676,54	3.646,92
FVG Region - Project PaGES	15.000,00	15.544,92	544,92
CEI project	-	7.694,30	7.694,30
ACCELERATE project	-	338.652,33	338.652,33
E-RIHS project	-	17.591,66	17.591,66
Other incomes	484,00	183,45	300,55
Total	**1.085.607,46**	**1.487.370,37**	**401.762,91**

Contributions for Operating Expenses

The amount of the Italian contribution for the activities of the statutory seat of the Consortium is equal to € 1.105.027,17. This amount of € 1.105.027,17 covered the costs for personnel, bodies, consultancies, and other costs of the seat not covered by specific projects externally funded. In March 2018, a report to the MIUR was submitted through AREA Science Park to detail the use of the annual contribution.

Costs

Operating Costs

Costs for Raw materials, Supplies, Consumables and Goods

This category includes costs incurred for the supply of consumables. The increase is a direct result of the increased activities of the Consortium, in particular with reference to internal research grants.

Category	Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
Costs for raw materials, supplies, consumables and goods	7.055,73	31.683,48	24.627,75
Total	**7.055,73**	**31.683,48**	**24.627,75**

Service Costs

It has been decided to divide the item service costs, to facilitate the clarity of the budget, into the following categories of expenses:

Category	31/12/2016	31/12/2017	Variation
Legal, fiscal and administrative consultancy	118.258,61	69.537,05	48.721,56
Technical consultancies	-	5.402,16	5.402,16
Administrative collaborators	25.781,87	4.800,00	20.981,87
Scientific and technical collaborators	53.314,29	50.142,86	3.171,43
Social security contributions of collaborators	8.962,18	25.592,18	16.630,00
Health contribution for collaborators	438,83	405,08	33,75
ISTAC remunerations	21.620,11	25.134,35	3.514,24
Travel costs for employees, collaborators, and bodies	84.139,05	114.112,25	29.973,20
Expenses for corporate meetings	5.560,89	6.006,40	445,51
Insurances	5.721,93	13.400,39	7.678,46
Representation costs	2.339,40	2.842,42	503,02
Consulting and salaries processing	4.099,43	7.598,82	3.499,39
Mobile phones	8.704,32	9.900,74	1.196,42
Annual software licenses	257,25	150,09	107,16
Workshops, seminars and publications	4.774,84	27.360,79	22.585,95
Canteen expenses	6.727,50	12.063,50	5.336,00
Bank charges	689.48	1.503,24	813,76
Postal charges	163,24	2.050,54	1.887,30
Fellowships	-	17.420,13	17.420,13
Maintenances	-	3.952,80	3.952,80
Training costs	-	4.976,90	4.976,90
Renting costs	-	1.151,13	1.151,13
Other costs	30.923,78	11.902,99	19.020,79
Total	**382.477,00**	**417.406,81**	**34.929,81**

The item “Other costs” includes mainly costs related to a contract for temporary employment.

Personnel Costs

Personnel expenses: breakdown

Category	31/12/2016	31/12/2017	Variation
Wages and salaries	299.574,80	466.462,44	166.887,64
Social security charges	83.085,32	135.524,09	52.438,77
Severance indemnities	20.298,50	30.929,11	10.630,61
Allowances to be paid	10.573,77	35.164,01	24.590,24
Director	131.818,03	151.432,77	19.614,74
Auditors	122.364,73	172.397,26	50.032,53
Total	**667.715,15**	**991,909,68**	**324.194,53**

The cost item "Wages and salaries", as well as the cost item "Director", include bonuses paid in 2017 with reference to the goals individually achieved.
The cost item "Auditors" includes the additional remuneration for the Chair of the Board of Directors and IAEC starting from the appointment date, approved by the General Assembly in October 2017.

Other Operating Costs

Other operating costs: breakdown

Category	Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
Membership fees	2.000,00	2.000,00	-
Rounding	67,81	91,62	23,81
Other taxes	314,22	445,66	131,44
Other expenditures	207,38	60,32	147,06
Donations	0,00	1.000,00	1.000,00
Total	**2.589,41**	**3.597,60**	**1.008,19**

Depreciation of Tangible and Intangible Assets

Depreciation is calculated on the basis of the useful life of the asset and its use in production. For the first year of use, the percentages applied have been reduced to half rate.

Intangible Assets

Description	Rate	Amount
Concessions and licences	20%	491,01
Total amortisation of intangible assets		491,01

Tangible Assets

Description	Rate	Amount
Office machinery	20%	2.486,81
Equipment	15%	7.667,73
Telephony and mobile telephony	20%	417,84
Office furniture	15%	1.768,57
Total amortisation of fixed assets		**12.350,95**

Taxation

Current tax	Balance as at 31/12/2016	Balance as at 31/12/2017	Variation
IRAP	23.838,00	29.625,00	5.787,00
Total	**23.838,00**	**29.625,00**	**5.787,00**

The annual tax is calculated on the amount of salaries paid to employees, the amount of fees paid to collaborators and the costs of contracts for temporary employment.
The Consortium, in the context of purchases realized and within the limits following from the Statute, may use VAT exemptions granted on the basis of Article 143(1)(g) and Article 151(1)(b) of Council Directive 2006/112/EC, and in accordance with Articles 50 and 51 of Implementing Regulation (EU) No. 282/2011 of the Council, and on the basis of Article 12 of Directive 2008/118 /EC.

Financial Costs and Revenues

In the financial management, accrued interest income on the bank account of the Consortium is stated as of 31.12.2017.

Interest on Current Account and Rounding and Exchange Rate Costs

The item represents the remuneration of deposits of the Consortium on current account N. 000103334723 OPENED AT Unicredit Banca.

Category	31/12/2016	31/12/2017	Variation
Interest on current account	108,58	130,22	21,64
Exchange rate costs	-	436,26	436,26
Total	**108,58**	**306,04**	**414,62**

These notes integrate the balance sheet (assets and liabilities) and the profits and loss accounts as at December 31st, 2017. The result for the year is a balance.

Comparison between Budget and Annual Account

Costs and Investment

Description	Budget approved	Implemented changes	Final budget	Total expenses for 2017	Expenditure rate
Internal research projects	648.000,00		648.000,00	275.393,18	42,50%
Training projects	34.000,00		34.000,00	18.992,22	55,86%
Call for Science and Technology	144.000,00		144.000,00	-	0,00%
Science Symposium	20.000,00		20.000,00	-	0,00%
Rw. for the best project join. pres. by PFs	25.000,00		25.000,00	-	0,00%
Bodies	300.000,00	66.000,00	366.000,00	365.594,93	99,89%
Employees	232.200,00	57.800,00	290.000,00	289.070,72	99,68%
Communication	94.500,00		94.500,00	33.802,31	35,77%
Travel Expenses	248.000,00	(71.000,00)	177.000,00	82.833,28	46,80%
External services, Consultants, Consumables	398.000,00		398.000,00	160.934,83	40,44%
IL&TT	33.000,00		33.000,00	1.398,89	4.24%
Fixed Assets for the Seat	50.000,00		50.000,00	32.129,09	64,26%
Taxes	30.000,00		30.000,00	29.667,05	98,89%
ACCELERATE (EU)	381.600,00	(57.800,00)	323.800,00	280.970,99	86,77%
E-RIHS (EU)	21.480,00		21.480,00	14.073,33	65,52%
PaGES 2 (Regional)	15.000,00		15.000,00	15.000,00	100,00%
CONTACT-CEI (other)	12.355,00		12.355,00	7.694,28	62,28%
ERIC Workshop w/ MIUR (National Funds)	-	4.000,00	4.000,00	2.676,54	66,91%
PaGES 3 (Regional)	-	1.000,00	1.000,00	678,10	67,81%
TOTAL COSTS (in cash)	**2.687.135,00**	**-**	**2.687.135,00**	**1.610.909,74**	**59,95%**
Support of Elettra to the Statutory Seat	200.000,00		200.000,00	2.884.165,00	74,38%
Activities contributing to strengthening	3.677.517,00		3.677.517,00		
TOTAL COSTS (in kind)	**3.877.517,00**	**-**	**3.877.517,00**	**2.884.165,00**	**74,38%**
TOTAL BUDGET (cash + in-kind)	**6.564.652,00**	**-**	**6.564.652,00**	**4.495.074,74**	**68,47%**

In accordance with the total amount of the budget approved by the GA in October 2016, some changes were made between the different budget lines during the year 2017. These changes refer to:

1. The decision of the GA taken in October 2017 to increase the remuneration of the Chair of the Board of Directors and IAEC starting from the appointment date.
2. The initiation of a new project PaGES3 in December 2017
3. The conclusion, in the first quarter of 2018, of a project funded by MIUR
4. The recalculation of the personnel resources involved in the ACCELERATE project during the year 2017.

Revenues

Description	Budget approved by GA	Revenues ascertained	Rate
Carry over 2016	604.216,62	668.217,86	111%
FOE - MIUR	5.530.000,00	2.645.835,00	48%
H2020 - ACCELERATE	381.600,00	338.652,53	89%
H2020 - E-RIHS	21.480,00	17.591,66	82%
FVG Region - PaGES 2	15.000,00	15.000,00	100%
CEI-CONTACT	12.355,38	7.694,30	62%
MIUR Project	-	2.676,54	n.a.
FVG Region - PaGES 3	-	544,92	n.a.
Other incomes	-	313,67	n.a.
Total	**6.564.652,00**	**3.696.526,48**	**56,31%**

Compared to the initial budget, the main difference between the estimated amount of the revenues and the actual amount is represented by the amount of the FOE contribution directly received from the Italian Ministry of Research, University and Education.
This was a consequence of the signing of a Collaboration Framework Agreement with Elettra in which the allocation of the resources for the CERIC Statutory Seat and the resources for strengthening the Italian partner facility were defined.

The following table includes an explanation of the difference between the actual carry over and the balance resulting from the budget, due to the investment made in 2017.
In the profit and loss account, costs and revenues have been accounted on an accrual basis, while in the budget we considered only the financial impact.

Comparison between budget and carry over	
Description	**Amount**
Total revenues	3.696.526,48
Total costs and Investment	(1.610.909,74)
Balance	2.085.616,74
(+) Investments	136.250,91
(-) Depreciation at 31.12.2017	(12.841,96)
CARRY OVER 2017	**2.209.025,69**

Statement of Cash Flow

The cash flow statement identifies the sources of cash inflows, the items on which cash was expended during the year, and the cash balance as at the end of the year.
In the following table are included the information about the historical changes in cash (and cash equivalent) referred to the operating, investing and financing activities.

Statement of cash flows for the years ending Dec. 31, 2017 and Dec. 31, 201 6		
	2017	**2016**
Cash flows from operating activities		
Receipts		
Grants	663.849,75	1.050.292,80
Contribution from the host country	2.645.835,00	1.500.000,00
Interest received	71,33	80,33
Other receipts	4.227,74	3.644,21
Payments		
Payments to staff	873.316,84	616.217,40
Insurance Payments	10.674,91	10.672,50
Suppliers	261.467,52	240.644,49
Other payments	187.308.92	116.004,99
Payments to project partners	760.348,33	-
Net Cash from Operating Activities	**1.220.867,30**	**1.570.477,96**
Cash flows from investing activities	-	-
Purchase of plant and equipment	113.346,26	2.070,64
Sale of plant and equipment	-	-
Other	-	-
Net Cash Flow from Investing Activities	**113.346,26**	**2.070,64**
Cash flows from financing activities	-	-
Proceeds from borrowings	-	-
Repayment of borrowings	-	-
Other	-	-
Net Cash Flow from Financing Activities	-	-
NET INCREASE/(DECREASE) IN CASH	1.107.521,04	1.568.407,32
CASH, BEGINNING OF THE YEAR	**1.907.039,24**	**338.631,92**
CASH, END OF THE YEAR	**3.014.560,28**	**1.907.039,24**

Net Financial Position - Trend for the period Jan-Dec 2017

The table represents the net debt position of the Consortium during the year, through a comparison of the following balance items: cash and cash equivalent + short-term credits - short term debts

Additional Disclosures on In-kind Resources (with reference to Directive 2013/34/EU)

In relation to in-kind contributions, which statutorily constitute a particularly significant element, in terms of resources and organization that can be used by the Consortium, it should be noted that it was not possible to acquire all the accounting values for 2017 according to the principles of consistency and auditability on the basis of the "Methodology for Defining the Values Involved in the CERIC Activities, and to Detail In-kind Contributions" developed in late 2015. However, it needs to be noted that, even before the set-up of the Consortium, some of the concerned PFs manifested themselves through this particular mode of contribution, which then allowed the immediate and consistent start of the activities. These values were quantified, albeit with the limitations set forth above, by the various PFs and are shown in the tables below in order to provide supplementary information, which enable a better understanding of the relevance of the total resources used by CERIC in the financial year 2017.

Value of the Partner Facilities and in-kind contribution. Consolidated data for 2017

Total costs of the overall ordinary scientific/technical activities of the partner facilities (PFs) in 2017

PF	Recurrent costs							
	Personnel	Travel & accomodation	Consumables	Services	Utilities	Overheads	Technical devaluation & maintenance, lease /rent costs of equipment & spaces	Total
AT	412.098,00	4.328,00	-	91.118,33	-	356.093,88	299.730,00	1.164.368,21
HR	164.832,00	-	58.557,07	5.076,33	75.153,34	-	52.235,93	355.854,67
CZ	457.359,00	32.294,00	145.420,00	16.157,80	-	32.315,56	691.054,00	1.374.600,36
HU	968.072,20	1.611,19	15.964,03	80.526,75	163.885,43	1.997.841,53	-	3.227.901,13
IT	372.299,76	8.019,56		10.275.779,21			1.012.383,57	11.668.482,10
PL	1.074.007,00	114.219,00	57.252,00	183.084,00	662.542,00	340.682,00	6.700.881,00	9.132.667,00
RO	532.031,00	20.935,00	60.398,00	29.300,00	-	38.069,00	457.930,00	1.138.663,00
SI	301.050,39	31.912,09	62.049,79	69.348,82	24.681,54	52,348,89	1.438.380,00	1.979.771,52
Tot.	**4.281.749,35**	**213.318,84**		**14.894.645,31**			**10.652.594,51**	**30.042.308,01**

Total costs of the ordinary scientific/technical activities of the partner facilities in 2017 - COMMITTED IN-KIND

PF	Recurrent costs							
	Personnel costs	Travel & accomo-dation	Consumables	Services	Utilities	Overheads	Technical devaluation & maintenance, lease/rent costs of equipment & spaces	Total
AT	48.800,00	433,00	-	9.211,83	-	39.609,00	94.790,86	189.844,69
HR	30.544,80	-	3.580,41	310,39	4.595,17	-	3.191,62	42.222,339
CZ	457.359,00	29.137,00	122.130,00	13.570,00	-	27.140,00	277.367,00	926.703,00
HU	138.036,35	1.611,19	-	-	-	-	-	139.647,54
IT	372.299,76	8.019,56		3.046.593,25			199.971,42	3.626.883,99
PL	-	956,00	-	-	-	-	-	956,00
RO	16.409,00	3.843,00	6.039,80	2.930,00	-	3.806,90	47.168,00	80.196,70
SI	111.598,63	588,89	17.922,82	26.695,90	6.591,15	12.754,62	72.025,50	248.177,51
Total	**1.172.047,54**	**44.588,64**		**3.343.481,24**			**694.514,40**	**5.254.631,82**

Values of equipment and spaces available to PFs in 2017

Partner facility	Present value (estimated)	Historical cost
Austria	4.600.000,00	4.600.000,00
Croatia	63.362,66	9.000.000,00
Czech Republic	1.099.455,00	2.437.274,00
Hungary	127.216,00	802.098,00
Italy	737.881,76	18.093.467,56
Poland	30.914.023,00	45.432.813,00
Romania	960.325,00	4.757.467,00
Slovenia	1.265.970,58	6.228.951,30
Total	**39.768.234,00**	**91.352.070,86**

Financial input of Partner Facilities

Financial input Partner Facilities received in 2017	
Austrian PF	545.544,57
Croatian PF*	17.020,24
Czech PF	1.944.889,00
Hungarian PF	1.758.713,72
Italian PF*	22.583.153,00
Polish	5.167.358,00
Romanian PF	4.372.984,00
Slovenian PF*	1.537.594,56
Total	**38.927.257,94**

Financial input Partner Facilities received in 2017 due to participation in CERIC/International Research Infrastructures	
Austrian PF	0,00
Croatian PF	17.020,24
Czech PF	1.711.255,00
Hungarian PF	-
Italian PF	3.482.807,47
Polish PF	3.341.415,00
Romanian PF	-
Slovenian PF	58.484,44
Total	**8.610.982,15**

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CERIC Overview

The mission and main purpose of CERIC, in line with the ERIC Regulation (EC No 723/2009), is to establish and operate a multidisciplinary distributed research infrastructure on a non-economic basis.

Mission

CERIC is a research infrastructure integrating and providing open access to some of the best facilities in Central and Eastern Europe, to help science and industry advance in all fields of materials, biomaterials and nanotechnology. It enables the delivery of innovative solutions to societal challenges in the fields of energy, health, food, cultural heritage and more.

Vision

CERIC co-creates the European Research Area by enabling the best global researchers to realize their ideas in a multicultural research environment with a worldwide reach. By expanding insight into materials on the nano-scale, CERIC contributes to solving contemporary societal challenges.

CERIC is an integrated multidisciplinary research infrastructure for basic and applied research in the fields of materials, biomaterials and nanotechnology. It integrates leading national research institutes into a unique international infrastructure, having its statutory seat in Trieste – Italy, and its nodes distributed in Austria, Croatia, Czech Republic, Hungary, Poland, Romania and Slovenia (Serbia is currently pending full membership). In each country, a Partner Facility (PF) ensures access and outreach to all national scientific communities and to users from all over the world, who compete for free access to 50 techniques available through a single entry point and based on the use of electrons, ions, neutrons and photons for the analysis and synthesis of materials. This service is also open to commercial users on market-based conditions.

The governing structure involves ministerial representatives of the Member Countries, as well as the directors of the Partner Facilities. CERIC management and research activities are distributed in the participating countries and cover administration, communication, technology transfer and project management. A common support system allows the distributed staff to operate in an integrated way for transnational and cooperative projects and joint ventures.

Each Member Country contributes to CERIC by making available and supporting a high-quality PF, which is continuously improved by being exposed to international users competing for access through peer-review evaluation and selection, based on the excellence, of their proposals. The PFs are strongly complementary to each other and act as a whole as an international agency providing support to the best researchers and research projects, contributing access to advanced analytical and synthesis facilities.

CERIC's international, pan-European approach, in line with ERIC Regulation EC No 723/2009, avoids duplication and fragmentation in the research system and increases the integration and competitiveness of the European Research Area (ERA), speeding up East-West alignment in the ERA.

CERIC Partner Facilities, Instruments and Techniques

AUSTRIA

Graz University of Technology

is dedicated to the structural characterisation of nanosystems with scattering techniques covering topics such as advanced materials, (bio-)polymers, proteins in solids, surfaces, liquids and in the gas phase. The facility provides access to its light and X-ray scattering laboratories, as well as to the Austrian SAXS beamline and Deep X-ray Lithography beamline, both at Elettra.

CROATIA

Ruđer Bošković Institute

is dedicated to the structural characterisation of nanosystems with scattering techniques covering topics such as advanced materials, (bio-)polymers, proteins in solids, surfaces, liquids and in the gas phase. The facility provides access to its light and X-ray scattering laboratories, as well as to the Austrian SAXS beamline and Deep X-ray Lithography beamline, both at Elettra.

CZECH REPUBLIC

Charles University Prague

has expertise in surface analysis, thin film growth and studies of the reaction mechanism on catalyst surfaces. It offers Photoelectron Spectroscopy (XPS, XPD, ARUPS) with Low Energy Ion Scattering Spectroscopy and LEED, Field Emission Gun Scanning Electron Microscope, Near Ambient Pressure XPS and access to the Materials Science Beamline at synchrotron Elettra dedicated to soft X-ray photoelectron spectroscopy and NEXAFS.

HUNGARY

Budapest Neutron Centre

performs and offers R&D in nuclear science and technology, studying the interaction of radiation with matter and doing isotope and nuclear chemistry, radiography and radiation chemistry, surface chemistry and catalysis (PGAA, NAA, RAD). Neutron scattering instruments allow investigation of the microscopic properties of solids, liquids, soft materials, biological objects and condensed matter (PSD, SANS, TOF, GINA, MTEST, BIO, TAST).

ITALY

Elettra Sincrotrone Trieste

covers a wide range of experimental techniques and scientific fields, including photoemission, spectromicroscopy, crystallography, dichroic absorption spectroscopy, x-ray imaging etc.

POLAND

Polish Ministry of Science and Higher Education

offers techniques based on synchrotron radiation: the PEEM/XAS beamline (200-2000 eV photon energy range) is equipped with PEEM - Photoemission Electron Microscopy - and XAS, devoted to spectroscopy studies by absorption of soft X-rays. The UARPES undulator beamline (8-100 eV photon energy range) is equipped with an ARPES end-station, allowing precise studies on the structure of energy bands of solids and their surfaces.

ROMANIA

National Institute of Material Physics

offers access to HRTEM and EPR laboratories for research in solid state physics and materials science, including the synthesis and characterisation of advanced materials for applications in microelectronics, catalysis, energy industry and ICT.

SLOVENIA

National Institute of Chemistry

offers NMR spectroscopy for chemical analysis and identification, for determining 3D structures and studying the dynamics of small and larger bio-macro-molecules, for tracking chemical reactions in analytical and bioanalytical procedures, for studying polycrystallinity and identifying metabolites and various amorphous forms.

Abbreviations

BoD	Board of Directors
CERIC	Central European Research Infrastructure Consortium
ERA	European Research Area
ERIC	European Research Infrastructure Consortium, a legal framework created by the European Commission to allow the operation of Research Infrastructures of pan-European interest.
FOE	Fondo Ordinario per il finanziamento degli Enti e istituzioni di ricerca (Ordinary Fund for the Financing of Research Entities and Institutions)
GA	General Assembly
IL&TT	Industrial Liaison and Technology Transfer
IR	Internal Regulations
ISTAC	International Scientific and Technical Evaluation Committee
MIUR	Italian Ministry of Education, University and Research
PI	Principal Investigator
PF	Partner Facility
RE	Representing Entity
RI	Research Infrastructure
R&D	Research & Development
S&T	Science & Technology

Light scattering at the TU Graz and Elettra
Graz and Trieste
www.tugraz.at

Ion beams at the Ruđer Bošković Institute
Zagreb
www.irb.hr

Surface analysis at the Charles University
Prague and Trieste
http://spl-msb.mff.cuni.cz/

Neutrons at the Budapest Neutron Centre
Budapest
www.bnc.hu

Synchrotron and laser light at Elettra
Trieste
www.elettra.eu

Synchrotron light at Solaris
Krakow
www.synchrotron.uj.edu.pl

Electron microscopy and EPR at the National Institute of Material Physics
Magurele
http://lab50.infim.ro

NMR at the National Institute of Chemistry
Ljubljana
www.nmr.ki.si

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