

## Results

- Study of ancient glazed pottery from Azerbaijan confirms the need for a multi-technique approach in cultural heritage research
- Scientists test caffeine as a model system for developing and designing new hydrogels for biomedicine, cosmetics and environmental control
- Friulia Venezia Giulia–Bavaria: Memorandum of Understanding between CERIC and SHARE strengthens research

## Events

- CERIC at the PLATFOM conference. Ljubljana – Slovenia, 6-7 Oct. 2016
- European Week of Regions and Cities. Brussels – Belgium, 10-13 Oct. 2016
- REinEU 2016. Bratislava - Slovakia, 26-28 Oct. 2016
- 5th ERIC Network Meeting. Paris – France, 8-9 Nov. 2016
- Falling Walls Conference 2016. Berlin – Germany, 9 Nov. 2016
- Czech-Italian Economic Forum. Prague – Czech Republic, 15 Nov. 2016
- RRI Tools Final Conference. Brussels – Belgium, 21-22 Nov. 2016
- Conference *Impacts of Public-Public Partnerships – expectations and experiences*. Brussels – Belgium, 22-23 Nov. 2016
- SECID 2016. Brussels – Belgium, 23 Nov. 2016
- Conference *Long-term sustainability of RIs. Exploring RIs full potential*. Brussels – Belgium, 25 Nov. 2016
- Smaller and Faster: Infrared and Terahertz Spectral-Imaging at the Nanoscale with Synchrotron Radiation and FEL sources. Trieste - Italy, 1-2 Dec. 2016
- International symposium: *Frontiers on wonderful world of nucleic acids*. Zgornji Brnik - Slovenia, 16 Dec. 2016
- Workshop on “In-Kind Contributions”. Rome - Italy, 19 Dec. 2016
- ACCELERATE kick-off meeting. Trieste - Italy, 26 Jan. 2016

## Highlights

- Art, humanities and science meet in the research on cultural heritage
- First researchers expected in SOLARIS in 2017
- Romanian NIMP launches its new official blog!
- Interview with Prof. Carlo Rizzuto at Trieste in Diretta (video)
- CERIC interview with Prof. Ernst Bauer (video)

# Results

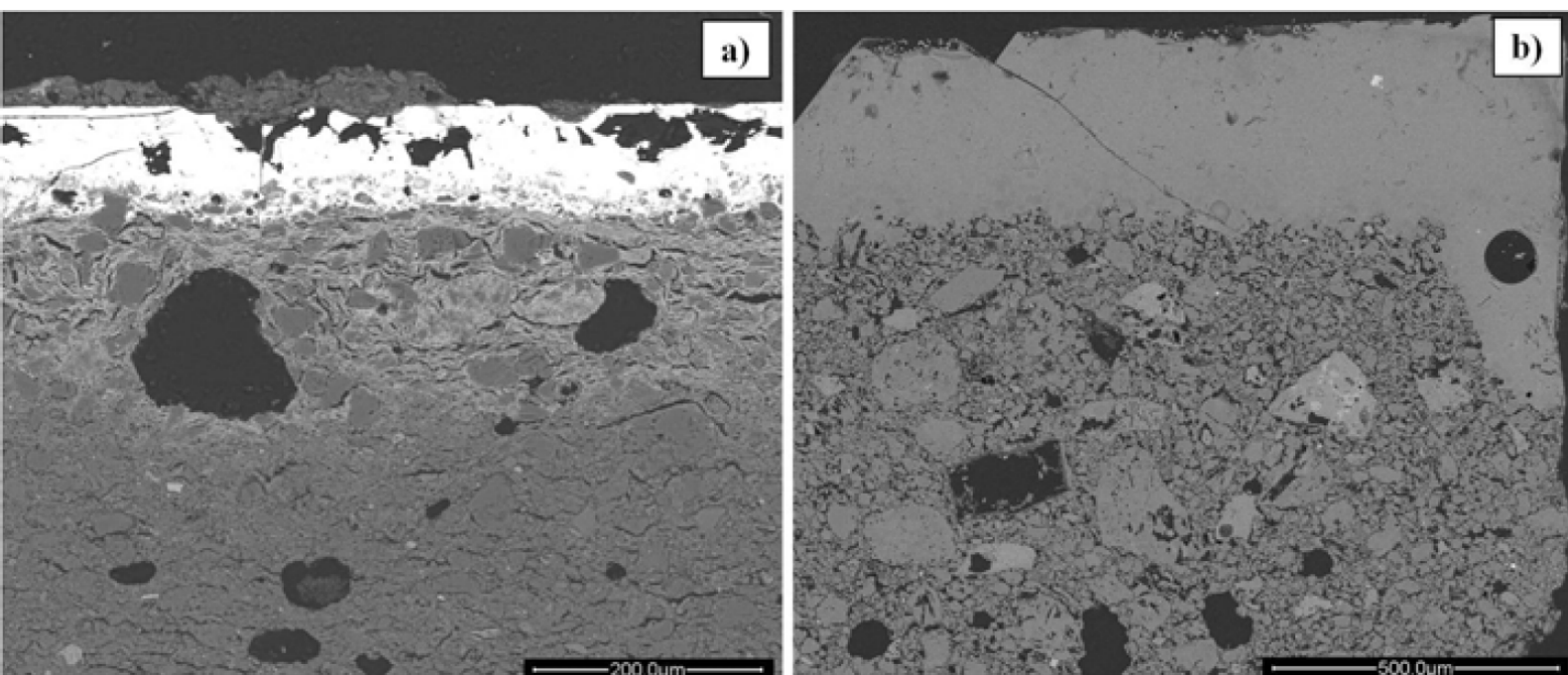
## Study of ancient glazed pottery from Azerbaijan confirms the need for a multi-technique approach in cultural heritage research\*

The combination of several techniques is fundamental to analysing different aspects of archaeological findings. An interesting example showing the importance of applying a multi-technique approach in this field is that of the latest research conducted by the research group to which the CERIC user **Valentina Venuti** belongs, which focused on eight archaeological pottery fragments from the medieval ruins of the Aghsu archaeological site in Azerbaijan.

The group applied a combination of complementary techniques: optical microscopy (OM), scanning electron microscopy – energy dispersive spectroscopy (SEM-EDS) and prompt gamma activation analysis (PGAA at the Hungarian CERIC partner facility – Budapest Neutron Centre) to define the raw materials and pigments used for the production and decoration of the samples, and X-ray diffraction (XRD) to assess their firing temperature.

The data obtained suggest the presence of different production technologies and raw materials (quartz, plagioclase, feldspar and hematite in one group of samples, quartz and plagioclase in the second one), probably due to the site position at the crossroads of commercial routes. Moreover, XRD analysis suggested that the original calcareous clay of both groups of samples was fired at temperatures higher than 850°C. Only for one group of samples was it possible to hypothesize Chinese production and provenance. However, more samples (both pottery fragments and local clays) need to be studied in order to confirm this hypothesis.

The work, which can overall be considered a milestone for future archaeometric studies in this area, is a first step towards further sampling campaigns about both archaeological and geological specimens needed for reconstructing the provenance of artefacts.



SEM micromorphological details of glaze and ceramic body

\*V. Crupi, Z. Kasztovszky, F. Khalillil, M. F. La Russa, A. Macchia, D. Majolino, B. Rossi, N. Rovella, S. A. Ruffolo and V. Venuti, Evaluation of complementary methodologies applied to a preliminary archaeometric study of glazed pottery from Aghsu (Azerbaijan), International Journal of Conservation Science, Vol. 7, Special issue 2, 2016:901-912

## Scientists test caffeine as a model system for developing and designing new hydrogels for biomedicine, cosmetics and environmental control\*\*

Hydrogels are a special class of materials that have a particular three-dimensional structure, with internal spaces that can host guest molecules or water solutions containing active molecules. This structure allows hydrogels to absorb large amounts of water without losing their elasticity. Hydrogels, made of biopolymers like sugar chains, can be used as superabsorbers for cosmetics and medical purposes, such as wound-dressing, and even as scaffold for tissue engineering. They have recently attracted some interest as model systems for “smart” hydrogels that are able to react with their environment (e.g. human skin) in a programmed and intelligent manner or for drug delivery.

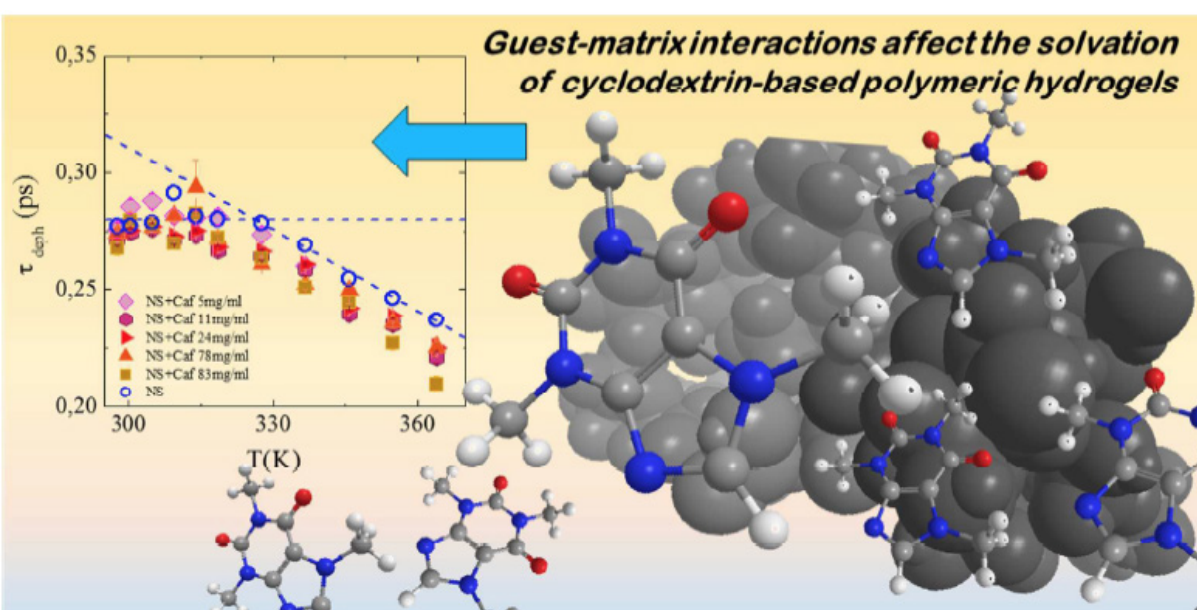
In this context, the working group around **Barbara Rossi** from the Italian CERIC facility, Elettra Sincrotrone Trieste, together with her co-workers from the University of Messina and Politecnico of Milan, have developed a hydrogel based on natural cyclodextrin – a particular derivative of glucose – that acts as a nano-sponge.

They recently published a study that investigates the mechanisms of entrapment, diffusion and release of guest molecules such as pharmaceutical active ingredients on these nano-sponges.

As a model drug, they used the simple and well-known caffeine molecule. They used UV resonant

Raman-Spectroscopy to analyse the structure of the model under different conditions. This method uses highly intensive ultra-violet light to monitor vibrations of the carbon atoms backbone within the nano-sponges. These vibrations are influenced by various factors, e.g. water uptake, drug loading and temperature.

For Raman spectroscopy, Rossi and her team used the CERIC IUVS instrument based at Elettra. They loaded the nano-sponges with various concentrations of caffeine at different temperatures. During their measurements, they discovered that caffeine significantly changes the temperature dependent properties of the nano-sponges. This shows for the first time that caffeine is not simply loaded into the structure of this special kind of hydrogel but actively changes the structure and the properties of the hydrogel. Furthermore, the molecular insights provided by UV-Raman spectroscopy for the first time allowed description and quantification of the caffeine induced structural changes within this type of nano-sponge. This valuable knowledge will enable further development of dextrin-based hydrogels and will help in the design of new strategies to control the loading, diffusion and release rates of bioactive molecules inside hydrogels for future drug delivery applications.



The effect of guest-matrix interactions on the solvation of cyclodextrin-based polymeric hydrogels is studied by UV Raman experiments.

\*\*B. Rossi, V. Venuti, F. D'Amico, A. Gessini, A. Mele, C. Punta, L. Melone, V. Crupi, D. Majolino and C. Masciovecchio, *Guest-matrix interactions affect the solvation of cyclodextrinbased polymeric hydrogels: an UV Raman scattering study in Soft Matter*, 2016, DOI: 10.1039/C6SM01647B



January 2017

## Friulia Venezia Giulia–Bavaria: Memorandum of Understanding between CERIC and SHARE strengthens research

Trieste - Italy, 25 October 2016

The Memorandum of Understanding signed on October 25th between the two European Research Infrastructure Consortia, CERIC-ERIC and SHARE-ERIC – with their seats in Trieste and Munich respectively – strengthens scientific collaboration between Friuli Venezia Giulia and Bavaria.

The President of the Region Friuli Venezia Giulia, **Debora Serracchiani**, declared: “Today’s event represents a relevant output of the bilateral agreement signed on May 4th by myself and Minister President Seehofer to strengthen the cooperation of our Regions in the fields of Transport and Connectivity, Economy and Education, Agriculture and Research & Innovation”.

The Executive Director of CERIC, **Jana Kolar**, and the Vice Chair of SHARE, **Guglielmo Weber**, explained that the two Consortia aim at combining their skills in the management of ERICs and research infrastructures in general, as well as at promoting greater synergies among available funds.

Jana Kolar added, “The agreement is a concrete action linking research infrastructures and represents a solid basis to strengthen relations between regions in the fields of research and innovation. It is also a further step towards the improvement of ERIC-related policies by the exchange of both personnel and best practices”.

“A special day, when materials science meets social sciences”, commented the Vice Chair of SHARE and

signatory of the MoU, Guglielmo Weber.

The ceremony was also attended by **Alfonso Franciosi**, President and CEO of Elettra, the CERIC Italian representing entity, **Giorgio Rossi**, Chair of ESFRI – European Strategy Forum on Research Infrastructures, and **Harry Tuinder**, representative of the Directorate General for Research and Innovation at the European Commission (EC) and two delegates of the Italian Ministry for Education, Training, University and Research, **Grazia Pavoncello** and **Salvatore La Rosa**.

After the signing, two roundtables took place, moderated by **Fabio Mazzolini**, Deputy Director for European and International Relations at CERIC-ERIC. The first addressed the role of research infrastructures in tackling major societal challenges, with a focus on the case of Friuli Venezia Giulia (FVG) and its current policy for active ageing. **Renata Bagatin** and **Gianluca Dominutti** actively participated from the region FVG, together with **Chiara Cristini** and **Paolo Molinari** from the regional Institute for Economic and Social Research (IRES). The second focused on Italian and European policies in the field of research infrastructures, with representatives from the EC (Harry Tuinder), ESFRI (Giorgio Rossi), MIUR (Grazia Pavoncello and Salvatore La Rosa), and research infrastructures (Jana Kolar and Guglielmo Weber).



**From left to right:** Debora Serracchiani - President of the region Friuli Venezia Giulia, Jana Kolar - Executive Director CERIC-ERIC, Guglielmo Weber - Vice-Chair SHARE-ERIC  
Photo: CERIC-ERIC, Roberto Barnabà



**From left to right:** Giorgio Rossi (Chair ESFRI), Harry Tuinder (European Commission, DG RTD), Debora Serracchiani (President Region Friuli Venezia Giulia), Jana Kolar (CERIC Executive Director), Guglielmo Weber (Vice Chair SHARE-ERIC), Alfonso Franciosi (President and CEO Elettra Sincrotrone Trieste)  
Photo: CERIC-ERIC, Roberto Barnabà

# Events

## CERIC at the PLATFOM conference

Ljubljana – Slovenia, 6-7 October 2016



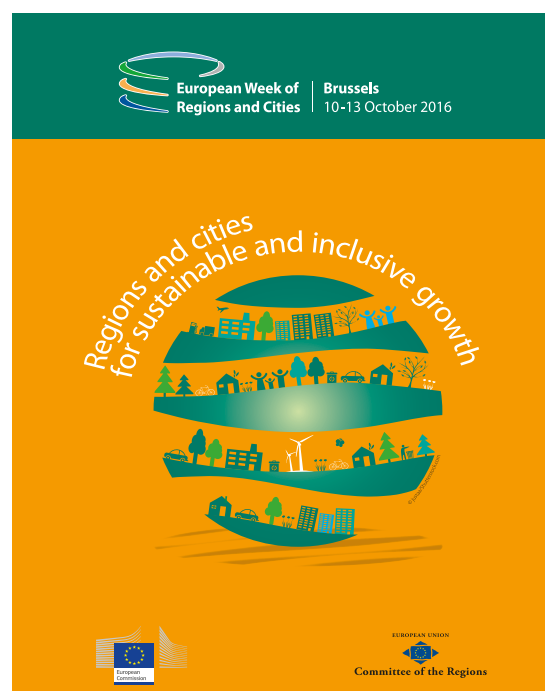
On 6-7 October 2016, the project's PLATFORM Annual Event took place, with Public to Public Partnerships for Inclusiveness and Innovation at its core. **Dr. Jana Kolar** participated with the presentation *Innovation in EC programs*, showing the principles at the basis of innovation management in P2Ps, in particular in CERIC and highlighting the tools to encourage knowledge and technology transfer, in particular focusing on the method and experience of the EIT, in which Kolar is involved as a member of the Governing Board. Dr. Kolar also took part in a round table discussion about inclusiveness issues faced by P2P networks, particularly in relation to less well performing EU countries.

*The H2020 project Platform of Bioeconomy ERA-NET Actions (PLATFORM) brings together ERA-NETs in the area of the Bioeconomy with the following objectives: to increase collaboration among actors, to foster inclusiveness, to increase capacities for efficient and effective ERA-NETs and to inform research policy making.*

## CERIC at the European Week of Regions and Cities

Brussels – Belgium, 10-13 October 2016

The 14th European Week of Regions and Cities, which took place in Brussels from 10 to 13 October, focused on the main challenges that European regions and cities are currently facing in issues related to economic growth. Discussions were intended to support the implementation of 2014-2020 ESIF programmes, demonstrate the results of EU investment, showcase examples of good practice and encourage input for possible future improvements. On behalf of Jana Kolar, CERIC's deputy director **Ornela De Giacomo** presented the synergies of regional, national and European funds that are concretely implemented by the CERIC Consortium.



## CERIC @ REinEU 2016

Bratislava - Slovakia, 26-28 October 2016



The international conference Re-Industrialisation of the EU 2016 was a prestigious event in the field of nanotechnologies, advanced materials and manufacturing technologies, bringing together researchers, top decision makers and innovators. Its goal was to emphasize and discuss the role of science, research and innovation in sustainable economic development and in the implementation of reindustrialization in Europe.

Together with ESS, ELI, ESRF and Helmholtz-Zentrum Geesthacht, CERIC participated with a dedicated booth for delivering information about commercial access to the available instruments and facilities of the distributed research infrastructure, which provides the opportunity of enhancing the competitiveness and innovation of European industry.

The above-mentioned institutions also organized a 90-minute session to highlight the role of analytical research infrastructures in the support of research and innovation for European industries.



## CERIC at the 5th ERIC Network Meeting

Paris – France, 8-9 November 2016

The 5th ERIC Network Meeting brought together representatives from ERICs, national governments and the European Commission, as well as research infrastructures planning on applying for ERIC status, to share best practices and discuss the main challenges that ERICs face in their implementing and operational phase. CERIC contributed to the discussion on the better organisation of the network, and on issues such as VAT exemptions, mobility of personnel and in-kind contributions, reporting on its practices, policies and future challenges.





January 2017

## CERIC at the Falling Walls Conference 2016

Berlin – Germany, 9 November 2016



The *Falling Walls Conference* took place in Berlin, as every year, on 9 November – the anniversary of the fall of the Berlin Wall. Twenty of the world's leading scientists were invited to present their current breakthrough research to 700 international guests. Both **Prof. Carlo Rizzuto** and **Dr. Jana Kolar** (in the picture), Chair of the CERIC General Assembly and CERIC Executive Director, respectively, attended the event.

The aim of the conference was to identify trends, opportunities and solutions for global challenges and discover international breakthrough research; connect outstanding researchers from different disciplines and support the interdisciplinary exchange of ideas internationally; build bridges between business, politics, academia and the arts; promote the latest scientific findings among a broader audience; and inspire people to break down walls in science and society. Prof. Rizzuto and Dr. Kolar took part in the Falling Walls Circle discussion on “Entrepreneurship – conditions for creating business” and the Berlin Debate on Science diplomacy, organized by Robert Bosch Stiftung GmbH.

## CERIC at the Czech-Italian Economic Forum

Prague – Czech Republic, 15 November 2016

**Dr. Aden Hodzic**, Industrial Liaison Officer at CERIC, participated in the *Czech-Italian Economic Forum* that was held in Prague on 15 November. The event, through institutional speeches and B2B meetings, had the goal of promoting the possibility of joint ventures between Italian and Czech Small and Medium-Sized Enterprises in the fields of nanotechnology, biotechnology, ICT, pharmacy and mechatronics. Almost 100 companies, including start-ups, and potential investors, took part in the event.



## CERIC at the RRI Tools Final Conference

Brussels – Belgium, 21-22 November 2016



RRI Tools is an EC funded project. Its final conference took place on 21 and 22 November in Brussels, to provide the research and innovation community with specific tools for the application of Responsible Research and Innovation (RRI) and its key issues: public engagement with science, gender equality, open access, ethics and research integrity and science education. CERIC policy officer, **Matthias Girod**, participated in order to get acquainted with the whole concept of RRI and its use for RI's, as well as to network and find valuable partners for future H2020 calls (e.g. SWAFS or SC).

January 2017

## CERIC at the conference *Impacts of Public-Public Partnerships – expectations and experiences*

Brussels – Belgium, 22-23 November 2016

**Dr. Jana Kolar**, CERIC Executive Director, moderated two plenary sessions and the closing plenary of the conference *Impacts of Public-Public Partnerships (P2Ps) – expectations and experiences*, which took place in Brussels on 22 and 23 November. The conference stressed the importance of public-public partnerships in the EU policy framework, which are the basis for instruments such as ERA-NET Confund, but also research infrastructures such as CERIC. The first session focused on European and national policy makers

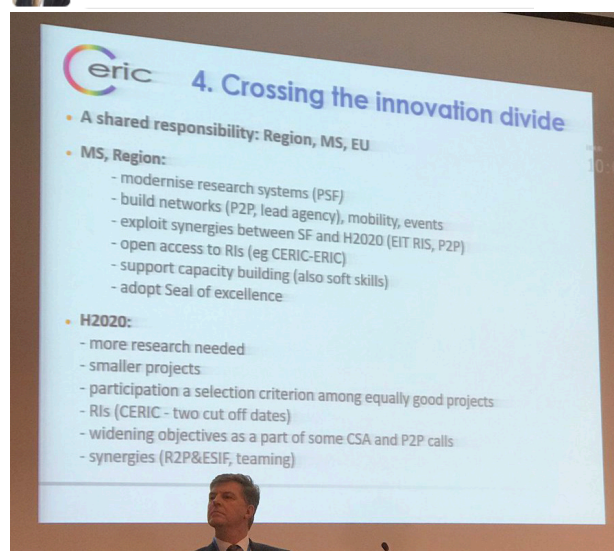
and their expectations towards P2Ps. The second session provided participants with an overall framework for impact assessment of P2Ps – from the national/European policy level to the network level, but also on the level of funded projects. Parallel sessions on the topic followed, as well as on impacts of P2Ps in the thematic context – in fields spanning innovation and technology, health, environment and climate change, bio-economy and energy.

## CERIC at SECID 2016

Brussels – Belgium, 23 November 2016

**Dr. Jana Kolar** participated in *SECID 2016 – Spreading Excellence and Crossing the Innovation Divide Conference* (Brussels – 23 November), to discuss the role of excellence in European research and innovation, as well as on opportunities presented through Horizon 2020, ESIF and other national and international programs. The conference had the final goal of bridging the innovation gap between countries, regions, research institutions, universities and enterprises.

**Kurt Deketelaere** @KurtDeketelaere · 23 Nov 2016  
 .@brezpanike on solving the R&I divide @LERUnews



## CERIC at the conference *Long-term sustainability of RIs. Exploring RIs full potential*

Brussels – Belgium, 25 November 2016

**Dr. Jana Kolar**, CERIC Executive Director, took part in the conference *Long-term sustainability of Research Infrastructures (RIs), Exploring RIs' full potential*, which was held in Brussels on 25 November. The goal of the conference was to present and discuss the main challenges identified in the online Stakeholder consultation on RIs' long-term sustainability launched in December 2015, and to collect suggestions and comments for the development of an Action Plan on RIs' long-term sustainability approach.

Jana Kolar had a presentation on how to develop human resources of RIs. In particular, she pointed

out that, in addition to the specialized curriculum for RIs managers that is currently being set up at the University of Milano, a variety of courses (also MOOC) on various topics, such as HR, administration, legal aspects, users access and support etc., may be prepared and offered. The ERIC Network also provides a valuable framework for exchanging knowledge and best practices.

Finally, staff exchange between RIs, for younger or experienced staff, may also be a useful practice to build professional figures suitable for the proper and effective management of RIs.



## CERIC at *Smaller and Faster: Infrared and Terahertz Spectral-Imaging at the Nanoscale with Synchrotron Radiation and FEL sources*

Trieste - Italy, 1-2 December 2016

**Matthias Girod**, policy officer at CERIC, presented the open access opportunities of the consortium to researchers and scientists participating in the conference *Smaller and Faster: Infrared and Terahertz Spectral-Imaging at the Nanoscale with Synchrotron Radiation and FEL sources*, which took place at the International Centre for Theoretical Physics – ICTP in Trieste, on 1 and 2 December. The event aimed at presenting the most recent technological advancements and innovative applications achieved with state-of-the-art near-field microscopes. The potentials of this technique in the field of science ranging, from biochemistry to material science, and encompassing time-resolved spectroscopy, were presented, focusing on the exciting opportunities offered by SR and FEL sources.

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

  
Central European Research  
Infrastructure Consortium

One single entry point to nearly 50 complementary R&D methods and techniques using photons, electrons, neutrons and ions, for structural investigation, analysis and synthesis of materials.



Peer-reviewed OPEN ACCESS  
with an innovative  
two-step application procedure

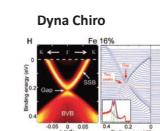


### CERIC Internal Research Projects

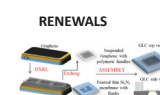
The project aims at developing *in-operando* experimental methods to study the process of heterogeneous catalysis under realistic conditions. This will enable a deeper insight into catalysis and will help designing more efficient catalysts.



The project focuses on the development and construction of special synchrotron suitable instrumentation to investigate the chiral and dynamic properties of matter. The results of this investigation have a wide range of applications, from synthesis of new polymers to drug design.



The project addresses the growing issue of possible toxic and physiological effects of nanoparticles. Basis of the project is the development of a graphene-based multi method sample cell to study the interactions between nanoparticles and human cells.



### Financial support

Travel and accommodation covered for 2 users per experiment



### CERIC awards for high quality publications and conference presentations

CERIC users are eligible to receive rewards to cover the full cost of open access publications, as well as conference fees for presenting the achieved results



### HERCULES School 20-24 March 2017

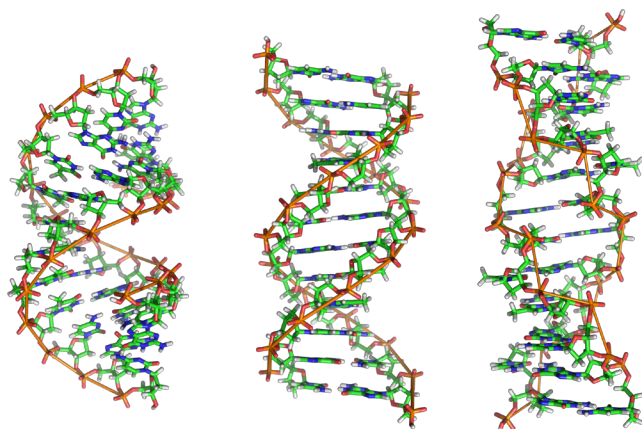
Training opportunity, with two days hands-on practicals at the MSB and SAXS beamlines at the Italian CERIC partner facility, for students, postdoctoral and senior scientists in the field of Neutron and Synchrotron Radiation for condensed matter studies

[www.ceric-eric.eu](http://www.ceric-eric.eu)



## International symposium: *Frontiers on wonderful world of nucleic acids*

Zgornji Brnik - Slovenia, 16 December 2016



The Slovenian CERIC partner facility, the NMR in Ljubljana, organized the international symposium *Frontiers on wonderful world of nucleic acids*.

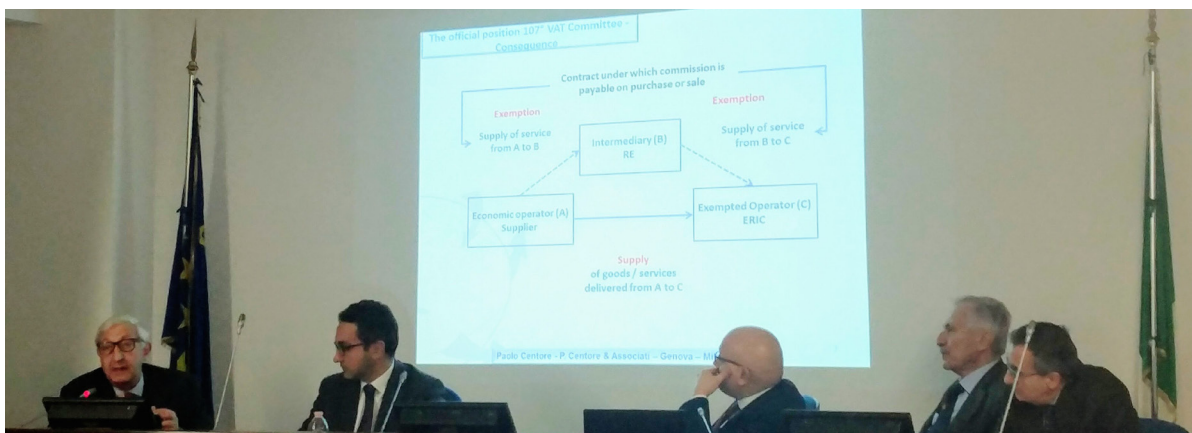
The symposium enabled the exchange of knowledge and expertise in the field of nucleic acid chemistry. Nucleic acids are fundamental building blocks of life, which display remarkable chemical functions, such as information storage, catalysis and molecular recognition. The presence of world-class elites from China, Japan and Italy will help shape the scope and increase the impact of the Slovenian NMR centre across national borders. The symposium will lead to increased networking between participants and their institutions.

### International speakers:

- Zhen Xi; Nankai University, Tianjin, China
- Daniela Montesarchio, University of Naples Federico II, Napoli, Italy
- Filomena Sica, University of Naples Federico II, Napoli
- Naoki Sugimoto, KONAN University; Frontier Institute for Biomolecular Engineering Research (FIBER)

# Workshop on in-kind contributions in ERICs

Rome - Italy, 19 December 2016



On December 19th, in Rome, Italian representatives of research infrastructures and ERICs met at a thematic workshop organized by CERIC in collaboration with the Italian Ministry for Higher Education, University and Research – MIUR, focused on the definition and assessment of in-kind contributions\*, which allow the setting-up and operation of most ERICs.

The experience of CERIC was also used as an example to show how aspects related to VAT exemption and accountancy are dealt with, also comparing this with the cases of other European research infrastructures.

National experts on the topics, including **Paolo Centore** and **Alessandro Pinto**, were invited to give presentations, together with the representatives of MIUR, **Antonio Di Donato** and **Gianluigi Consoli**, and the Chair of the CERIC General Assembly, **Carlo Rizzuto**.

*The IKC concept refers to a transfer of goods, services, personnel, intellectual property etc., between two research entities, without any direct payment or transfer of property. In-kind contributions are different from a rental or other economic exchanges. The exchanges are without any economic return in cash or in goods and/or services. Rather, in the context of ERICs and research infrastructures in general, the IKC take place within a scientific/technical collaboration based on sharing and exchanging the results made available through their publication, following the rules applied within the research activities.*

They discussed the possibility of ERICs and their national Representing Entities, of purchasing goods and services in the VAT exemption regime both at national and in cross-border cases. A specific issue is the appropriate recording and accounting of resources contributed in-kind by the partners and their values as part of the assets of the participating institutions.

The workshop was the first of a series of meetings and roundtables on the general topic of the ERICs, co-organized by CERIC and MIUR, which will continue in 2017 with the goal of defining a common and integrated framework for the management of research infrastructures through the ERICs, with reference in particular to their fiscal and financial features and to the need to adopt common international standards for accounting and assessing the in-kind contributions that allow the functioning and operation of ERICs.

## ACCELERATE kick-off meeting

Trieste – Italy, 26 January 2017

The H2020 funded project *ACCELERATING Europe’s Leading Research Infrastructures (ACCELERATE)* will start on January 1st, 2017. As coordinator of the project, CERIC will organize the kick-off meeting in Trieste on January 26th. Partners from six European countries, including the European Spallation Source-ERIC and the Extreme Light Infrastructure (ELI), will meet and discuss the first steps of the project. The main focus of ACCELERATE is outreach to new users in the academic and industrial sectors, the socio-economic return of research infrastructures (RI) and the development of standardized operational procedures for international RIs in general and ERICs in particular.

# Highlights

## Art, humanities and science meet in the research on cultural heritage

*CERIC user, Prof. Valentina Venuti, tells us more about her research in this field*



Have you ever wondered what kind of work lies behind artefacts that you see in museums and ancient buildings, from frescos to ceramics, to jewels, glasses and gems? If you think about the professionals involved in the preservation and conservation of cultural heritage, you probably imagine archaeologists, art historians and restorers. However, scientists such as physicists and chemists play a crucial role in the process of reconstructing the social, historical and economic framework within which artefacts were produced, used and exchanged. Their scientific findings and opinions are fundamental to confirm and support the assumptions made by their colleagues in the humanistic field.

**Valentina Venuti**, Associate Professor of Valentina Venuti, Associate Professor of Experimental Physics at the University of Messina and CERIC user, told us about her research on cultural heritage, also highlighting why multidisciplinary is so important in this field, and showed the results of some of the scientific work conducted by the research group from Messina to which she belongs, composed of **Prof. Domenico Majolino**, **Prof. Vincenza Crupi** and herself.

In the last 20 years, the research group has collaborated with a number of institutions (museums, universities, libraries, local and national bodies and authorities etc.) to study and analyse a wide variety of samples belonging to important archeological sites, from Sicily to Azerbaijan, as is the case of the latest publication stemming from access to CERIC facilities<sup>1</sup>.

The main goals of their research are linked to the possibility of obtaining data about the chemical-physical and mineralogical-petrographic composition and the authenticity of artefacts with historical and artistic relevance<sup>2</sup>. This information is fundamental to backtrack their geographical and temporal origin, as well as the firing temperature and the manufacturing techniques used for their production, also providing the opportunity to reconstruct the commercial and cultural exchanges between populations. At the same time, research on cultural heritage allows assumptions and suggestions to be proposed for possible restoration work using the most appropriate techniques and the most suitable materials.





January 2017

Most of the analysed finds are ancient, precious and very fragile. One could argue that these unique materials may be damaged if studied with scientific methods deploying radiations. Materials scientists are obviously well aware of their responsibility to keep intact the historical value of the objects that they analyse. They succeed in doing so by performing structural characterization of the samples at the micro-, meso- and macro-scale, adopting and combining non-invasive and micro-destructive techniques, using both neutron and electron sources, in a multi-technique approach such as that offered by CERIC.



Depending on the spatial scale researchers want to observe, on the interest in the bulk or rather in the surface of artefacts, and on the type of information they want to retrieve, different instruments and techniques are used. For analysis of the bulk properties of finds and due to the capacity of neutrons to penetrate deeply into materials, neutron spectroscopy techniques (e.g. neutron diffraction<sup>3</sup>, small-angle neutron scattering – SANS<sup>4</sup>, prompt gamma activation analysis – PGAA<sup>5</sup>) are used to observe structures of different size, ranging from elements to mineral phases, to aggregates and texture patterns, to petrographic properties and macroscopic inhomogeneities.



Synchrotron radiation techniques (XAFS<sup>6</sup>, Raman spectroscopy<sup>7</sup>, Infrared spectroscopy<sup>8</sup>, X-ray fluorescence – XRF<sup>9</sup>) are used mainly to identify the key elements and thus characterize pigments and glazes on the samples' surface. They allow, for example, information to be collected on major and minor constituents of pigments on various types of substrates, such as canvas, sculptures, wall paintings and ceramics, distinguishing between synthetic and natural, organic and inorganic substances.

The information obtained is useful for making a correct spatial and temporal classification of the artefacts, as well as for assessing their state of conservation and for discovering the lines of communication and trade exchange available in the period in which the finds were produced.

Moreover, portable Raman spectrometers – also in combination with XRF instruments and micro-Raman spectroscopy – are used for *in-situ* measurements whenever the finds cannot be moved from archaeological sites or museums. They have been demonstrated to be very reliable, for example in the identification of pigments on samples of various typologies, including pottery, statues and frescoes, dating back to the II/III century A.D., different in colour, support and shape, at the ruins of Villa dei Quintili in Rome (Italy)<sup>10</sup>.

January 2017



From left to right: Prof. Vincenza Crupi, Prof. Valentina Venuti, Prof. Domenico Majolino

The data and the knowledge provided by Prof. V. Venuti and her colleagues are useful for preserving the existing cultural heritage and for reconstructing and restoring ancient objects and finds by applying the same processes and techniques used in the past, thus keeping the same features of the originals. In this way, anybody visiting museums or interested in history and art, pupils, humanists, scientists and ordinary people, can have a more complete picture of the cultural environment in which artefacts were found, of the historical context and cultural features related to them and to their craftsmen. This allows acquisition of a greater awareness of history in its social, economic, cultural and artistic features, as well as of the environment in which we live, in which we are often surrounded by monuments and testimonies of the ancient past.

## CERIC interview with Prof. Valentina Venuti

Trieste, Italy

**Valentina Venuti** is Associate Professor of Experimental Physics at the University of Messina (Italy). She is also a CERIC user conducting research in the fields of cultural heritage and soft matter.

The interview focuses on the scientific research in the **cultural heritage** field, conducted by the research group composed by Prof. Domenico Majolino, Prof. Vincenza Crupi, PhD student Giuseppe Baldini and herself.



[CLICK HERE TO WATCH THE VIDEO](#)

<sup>1</sup> See article *Study of ancient glazed pottery from Azerbaijan confirms the need for a multi-technique approach in cultural heritage research* in the *Results* section of this newsletter.

<sup>2</sup> D. Barilaro, G. Barone, V. Crupi, D. Majolino, P. Mazzoleni, M. Triscari, V. Venuti, *Characterization of ancient amphorae by spectroscopic techniques*, *Vibr. Spectrosc.*, **42** (2006) 381-386

<sup>3</sup> D. Barilaro, V. Crupi, D. Majolino, V. Venuti, G. Barone, G. Tigano, S. Imberti, W. Kockelmann, *A non-invasive analysis of 'proto-majolica' pottery from southern Italy by TOF neutron diffraction*, *J. Phys.: Condens. Matter*, **20** (2008) 104254 (6pp)

<sup>4</sup> C. Bottari, G. M. Crisci, V. Crupi, V. Ignazzitto, M. F. La Russa, D. Majolino, M. Ricca, B. Rossi, S. A. Ruffolo, J. Teixeira, V. Venuti, *SANS investigation of the salt-crystallization- and surface treatment-induced degradation on limestones of historic-artistic interest*, *Appl. Phys. AAppl. Phys. A*, **122** (2016) 721 (9pp)

<sup>5</sup> V. Crupi, Z. Kasztovszky, F. Khalillil, M. F. La Russa, A. Macchia, D. Majolino, B. Rossi, N. Rovella, S. A. Ruffolo and V. Venuti, *Evaluation of complementary methodologies applied to a preliminary archaeometric study of glazed pottery from Agsu (Azerbaijan)*, *Int. J. Cons. Sci.* **7** (2016) 901-912

<sup>6</sup> D. Barilaro, V. Crupi, S. Interdonato, D. Majolino, V. Venuti, G. Barone, M. F. La Russa, F. Bardelli, "Characterization of blue decorated Renaissance pottery fragments from Caltagirone (Sicily, Italy)", *Appl. Phys. A*, **92** (2008) 91-96

<sup>7</sup> V. Crupi, V. Allodi, C. Bottari, F. D'amico, G. Galli, A. Gessini, M. F. La Russa, F. Longo, D. Majolino, G. Mariotto, C. Masciovecchio, A. Pezzino, B. Rossi, S.A. Ruffolo, V. Venuti, "Spectroscopic investigation of Roman decorated plasters by combining FT-IR, micro-Raman and UV-Raman analyses", *Vibr. Spectrosc.*, **83** (2016) 78-84

<sup>8</sup> CERIC Experiment n. 20147024 PGAA, *SR-based FTIR and Raman spectroscopies for the archaeometric investigation of decorated pottery fragments (XIX century A. D.) from Azerbaijan archaeological site*, data in progress.

<sup>9</sup> F. Bardelli, G. Barone, V. Crupi, F. Longo, D. Majolino, P. Mazzoleni, V. Venuti, "Combined non-destructive XRF and SR-XAS study of archaeological artefacts", *Anal. Bioanal. Chem.*, **399** (2011) 3147-3153

<sup>10</sup> R. Alberti, V. Crupi, R. Frontoni, G. Galli, M. F. La Russa, M. Licchelli, D. Majolino, M. Malagodi, B. Rossi, S. A. Ruffolo, V. Venuti, "Handheld XRF and Raman equipment for the in situ investigation of Roman finds in the Villa dei Quintili (Rome, Italy)", *J. Analyt. Atom. Spectrom.* (2016), DOI: 10.1039/C6JA00249H

January 2017

## First researchers expected in SOLARIS in 2017

Krakow - Poland, 5 December 2016

In 2017, the National Synchrotron Radiation Centre SOLARIS, the CERIC Polish partner facility and the only infrastructure of this type in Central and Eastern Europe, will welcome its first users to allow them to conduct complex experiments in various fields of study: physics, chemistry, medicine, geology etc. Their research will lead to the development of new materials, photovoltaic cells, detectors etc.

SOLARIS was launched in September 2015. Since then, a team of over 40 people has been working to make the infrastructure available for scientists. Experienced users are now conducting research using one beamline. They do this at their own risk, since equipment parameters are not yet optimal. Their measurements help prepare the end-station for regular users.

“We are about to achieve optimum equipment parameters. We want our future users to have state-of-the-art and perfectly calibrated devices at their disposal. However, it all takes time and effort” - said the director of SOLARIS and member of the CERIC Board of Directors, **Prof. Marek Stankiewicz**.

The professor added: “SOLARIS will be available for users from all Polish research institutions. We will also accept groups from abroad, through the calls for proposals of the Central European Infrastructure Consortium CERIC-ERIC, in which SOLARIS represents Poland”.

In the future, the synchrotron, which offers two beamlines, will host a dozen of them. It will operate 24 hours a day and research will be carried out by several groups simultaneously.

**Source:** [Polska Agencja Prasowa - PAP](#)



**CLICK HERE TO WATCH THE VIDEO**  
(in Polish only)

## Romanian NIMP launches its new official blog!

Magurele - Romania

The National Institute for Materials Physics (NIMP), the representing entity of Romania in CERIC, has launched its official new blog, on which all research results, news and information about upcoming events will be posted, with the goal of informing audiences and keeping them up to date with all activities, achievements and events of the institute.

NIMP is devoted to fundamental and applied research and development, with a particular emphasis on solid state physics and materials research. NIMP is developing as a CENTER OF EXCELLENCE for international cooperation and high-level education, providing assets for interdisciplinary research in materials science.

Please find more information here: <https://incdfm.wordpress.com/about/>



## Interview with Prof. Carlo Rizzuto at Trieste in Diretta

*Trieste, Italy*

Prof. Carlo Rizzuto, Chair of the CERIC General Assembly, speaks about research and its international dimension in the TV program Trieste In Diretta - Telequattro (interview in Italian only).



**CLICK HERE TO WATCH THE VIDEO**  
(in Italian only)

## CERIC interview with Prof. Ernst Bauer

*Trieste, Italy*

Prof. Ernst Bauer is a distinguished German-American physicist, a pioneer in **surface physics** and inventor of microscopy techniques. He is currently conducting research at CERIC-ERIC for better understanding the processes involved in the activation and deactivation of catalysts, by adopting a multi-technique approach.



**CLICK HERE TO WATCH THE VIDEO**



Send your comments, articles and contributions to:  
[press@ceric-eric.eu](mailto:press@ceric-eric.eu)



Read more news and keep updated about CERIC-ERIC  
opportunities and events on our website

[www.ceric-eric.eu](http://www.ceric-eric.eu)