



**TECHNART 2009**

**Non-destructive and Microanalytical Techniques in Art  
and Cultural Heritage**

**Athens, 27 - 30 April 2009**

**PROGRAM and ABSTRACTS**

## AN INTEGRATE STUDY FOR MAPPING THE DAMPNES DISTRIBUTION ON WALL PAINTINGS

N. PROIETTI<sup>1\*</sup>, D. CAPITANI<sup>1</sup>, M. GOBBINO<sup>1</sup>, L. SOROLDONI<sup>2</sup>, U. CASELLATO<sup>3</sup>,  
M. VALENTINI<sup>4</sup> and E. ROSINA<sup>5</sup>

<sup>1</sup>Institute of Chemical Methodologies, CNR, Area of Research of Rome, Monterotondo, Italy

<sup>2</sup>Accademia delle Belle Arti *Aldo Galli*, Como, Italy

<sup>3</sup>Institute of Inorganic Chemistry and Surfaces, CNR, Area of Research of Padua, Padua, Italy

<sup>4</sup>Energy Department, Polytechnic of Milan, Italy <sup>5</sup>BEST Department, Polytechnic of Milan, Italy

### Introduction

Dampness is a major cause of decay to porous materials such as stone, brick, mortar and plaster as shown in the scientific literature of the conservation science. Accurate diagnosis of the cause and extent of damp is a fundamental step for preserving wall paintings. Nevertheless, the moisture distribution within a wall painting is difficult to determine. This paper shows the study performed on the frescoes in S. Rocco, Cornaredo (Milan, Italy). The church is seriously affected by moisture diffusion which causes damage to the frescoed surfaces. In this work the monitoring of dampness in the wall painting of this church has been performed using an integrated approach of unilateral NMR and IR Thermography (IRT), supported by the traditional gravimetric methods. The unilateral NMR technology is fully portable and can be directly applied *in situ*, without any sampling. In this study the results obtained by this portable and non invasive NMR technique are related to the results obtained with two conventional techniques used to detect and measure the dampness: the gravimetric methods and IRT. IRT is a non-contact, ND test that uses an infrared camera to detect and record infrared energy producing a thermal image of the object's surface temperature. Current IRT procedures [1,2] do not easily supply quantitative data of the water content, only the qualitative approach can be extensively applied. The simplest solution of quantifying moisture consists in the integration of IRT with the direct measurements of water provided by other testing, such as weighting tests, moisture probes, etc [3].

### Experimental

NMR measurements were performed at 0.5 cm of depth in the plaster. Data processing allowed the obtainment of maps in which color gradients represent the differences of moisture content. On the same wall, author accomplished a preliminary thermal scanning, which allowed to detect colder areas. The researchers collected samples from these zones, and they measured the water content by gravimetric tests (UNI 11085).

### Results

Recently we have demonstrated that the unilateral NMR can be successfully used to monitor the distribution of dampness in wall paintings [4].

In fact, the intensity of the NMR signal is proportional to the water content [5]. The map obtained by a suitable processing of NMR data allows an easy visualization of the distribution of the dampness. A proper calibration procedure with suitable specimens was performed to calibrate the NMR signal and therefore to obtain a quantitative evaluation of the moisture content. The comparison between IRT, NMR and gravimetric tests shows a good qualitative correspondence of the processed data. Beside to obtain the map of moisture diffusion on the surface, and underneath it, the integration of results also allows the hygroscopicity of the very exterior layer of the surface to be mapped.

### Conclusions

The application of NMR shows its effectiveness in mapping moisture distribution: the resulting map is much more accurate and detailed than IRT map. This first set of measurement shows the effects of the interaction of different plasters and restoration products with the air at severe microclimatic condition (low temperature and high RH). NMR application is a consistent improvement to the study of thermo-hygrometrical behaviour of surfaces *in situ*.

### References

1. E.Grinzato, P. Bison and V. Vavilov, Non destructive Evaluation of Moisture Content in Buildings. Theory and Experiments, in *International Symposium: Dealing with Defects in Buildings*, Varenna, Italy, (1994).
2. E. Rosina and N. Ludwig, Optimal thermographic procedures for moisture analysis in buildings materials, in *Diagnostic Imaging Technologies and Industrial Applications Conference*. SPIE proceedings 3827 (1999), pp.22-33.
3. L.Binda, A.Saisi, N.Ludwig, C.Maierhofer, S.Leipold, D.Schaurich: "Combination of non destructive testing methods for characterisation of the moisture content and distribution in a historic brickwall". Proceedings of *RILEM- Rehabilitation of structures* Melbourne 9/98 pp.112-129
4. N. Proietti, D. Capitani, E. Rossi, S. Cozzolino, A.L. Segre, J. Magn. Reson. 186: 311 (2007).5. N.Proietti, D.Capitani, S. Cozzolino, M. Valentini, E. Pedemonte, E. Princi, S. Vicini, A.L. Segre J. Phys. Chem. B 110: 23719 (2006).

## **CONFERENCE PROGRAM**

## Monday, 27 April 2009

8:30-9:20		Registration
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9:20-10:30		<b>INNOVATIVE TECHNIQUES &amp; METHODOLOGIES I</b> <i>Session chairs: A.G.Karydas, D. Anglos</i>
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9:20		Welcome address
9:30	O1 Invited	<b>The construction of the big monuments in Ancient Egypt: New insight from elemental and structural analysis</b> <u>G. Demortier</u>
10:00	O2 Invited	<b>What can confocal x-ray microscopy do for investigations of art and cultural heritage?</b> <u>B. Kanngießler</u>
10:30		Coffee break
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11:00-12:50		<b>INNOVATIVE TECHNIQUES &amp; METHODOLOGIES II</b> <i>Session chair: C. Fotakis</i>
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11:00	O3 Invited	<b>Raman Microscopy, pigments and interfaces with arts and archaeology</b> <u>R.J.H. Clark</u>
11:30	O4	<b>The technological study of renaissance bronzes with the help of neutron imaging techniques</b> <u>R. Van Langh</u> , E. Lehmann, A. Kaestner, S. Hartmann and F. Scholten
11:50	O5	<b>X-ray tomographic microscopy compared to ion polished paint cross section of 19th century paints with and without metal soap aggregates</b> <u>J. J. Boon</u> , E. S .B. Ferreira, J. Van der Horst, M. Stampanoni and F. Marone
12:10	O6	<b>Analytical techniques for understanding the execution procedures used to craft large bronze masterpieces along the centuries</b> <u>S. Siano</u>
12:30	O7	<b>Painting techniques and state of conservation of wall paintings in St. Nicolas church at Zagori-Greece</b> <u>S. C. Boyatzis</u> , A. Terlix, G. Pavlopoulos, A. Karabotsos, E. Tziamourani, N. Minos and E. Ioakimoglou
12:50		Lunch break



Monday, 27 April 2009

14:00-15:30

**INNOVATIVE TECHNIQUES & METHODOLOGIES III**

*Session chair : R. V. Grieken*

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- 14:00 O8 **On site analysis of artifacts excavated from Egypt by using newly developed portable diffractometer and fluorescence spectrometer**  
Invited I. Nakai, Y. Abe, K. Takahashi, N. Kawai and S. Yoshimura
- 14:30 O9 **Fluorescence and vibrational spectroscopy for the analysis of the ageing of selected natural varnishes**  
A. Nevin, D. Comelli, I. Osticioli, G. Valentini, L. Toniolo and R. Cubeddu
- 14:50 O10 **NMR spectroscopy in cultural heritage materials analysis**  
A. Spyros
- 15:10 O11 **Unlocking documentary antiquities with AXSIA multi-spectral imaging**  
R.T. Macfarlane, P. Rossi, A.J. Antolak, P. Kotula, B.L. Doyle and S.M. Bay
- 15:30 Coffe break
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15:30-16:50

**CONFOCAL X-RAY MICROANALYSIS AND IMAGING**

*Session chair: Z. Smit*

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- 15:30 O12 **Non-destructive, depth resolved investigation of historical glass objects by 3D micro X-ray fluorescence analysis – X-ray tube and synchrotron radiation measurements**  
I. Mantouvalou, K. Lange, T. Wolff, M. Pagels, L. Lühl , O. Hahn and B. Kanngießer
- 16:10 O13 **3D imaging with a confocal  $\mu$ -PIXE arrangement**  
N. Grlj, M. Žitnik, P. Pelicon, D. Sokaras, A. G. Karydas and B. Kanngießer
- 16:30 O14 **3D micro-XRF analysis of Ancient Attic black glazed ceramics**  
D. Sokaras, E. Aloupi, A.G. Karydas, V. Kantarelou, I. Mantouvalou, B. Hesse, L. Lühl and B. Kanngießer

16:50-17:30

**VENDORS SESSION**

*Session chairs: A.G.Karydas, D. Anglos*

17:30-19:00

**POSTER SESSION I**

*Session chairs: I. Rabin, C. Tokarski*

19:00-21:00

Welcome Reception

**Tuesday, 28 April 2009**

9:00-10:30      **OPTICS AND LASERS**  
*Session chair: I. Schechter*

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|-------|----------------|---|
| 9:00  | O15<br>Invited | <b>Identification and topography of pigments and varnishes by different optical techniques</b><br><u>M. Elias</u>   |
| 9:30  | O16            | <b>Filamentation driven terahertz time-domain-spectroscopy for the analysis of cultural heritage related materials</b><br>J.-M. Manceau, C. Fotakis and <u>S. Tzortzakis</u>  |
| 9:50  | O17            | <b>Insights into the use of red lakes in wall paintings by Masolino from in situ analysis and examination of microsamples</b><br><u>D. Comelli</u> , A. Gallone, A. Nevin, I. Osticioli, G. Valentini, L. Toniolo, A. Longoni, R. Albert and R. Cubeddu |
| 10:10 | O18            | <b>Compositional depth-profiles of excavated marble patinas and possible use in authenticity investigations</b><br><u>K. Polikreti</u> and C. Christofides  |
| 10:30 |                | Coffee break  |
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11:00-12:50      **NEUTRONS**  
*Session chair: V. Argyropoulos*

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| 11:00 | O19<br>Invited | <b>Non-destructive neutron analysis techniques at ISIS</b><br><u>W. Kockelmann</u> and E. Godfrey  |
| 11:30 | O20            | <b>Neutron diffraction measurements for the characterization of four Japanese artworks of Tokugawa age</b><br><u>F. Grazzi</u> , L. Bartoli, F. Civita and M. Zoppi  |
| 11:50 | O21            | <b>Investigation of the content of ancient Tibetan metallic Buddha statues by means of neutron imaging methods</b><br><u>E. H. Lehmann</u> , S. Hartmann, M. Salque and M. O. Speidel  |
| 12:10 | O22            | <b>Spatial element distribution from prompt gamma activation imaging</b><br><u>Z. Kis</u> , L. Szentmiklósi, T. Belgya, Zs. Kasztovszky and The Ancient Charm Collaboration  |
| 12:30 | O23            | <b>Multifunctional encoding system for assesment of movable cultural heritage</b><br><u>V. Tornari</u> , E. Bernikola, K. Hatziyannakis, W. Osten, R.M. Grooves, M. Georges, T. Cedric, G.M. Hustinx, J. Rochet, E. Kouloumpi, M. Doulgeridis, T. Green and S. Hackney |
| 12:50 |                | Lunch break  |

**Tuesday, 28 April 2009**

14:00-15:30		<b>SYNCHROTRON RADIATION</b> <i>Session chair: J.J. Boon</i>
14:00	O24 Invited	<b>Combined use of x-ray milli- and microprobes for non-destructive analysis of large cultural heritage artefacts</b> <u>K. Janssens</u> , J. Dik, G. Van Der Snickt, M. Alfeld and K. Rickers
14:30	O25	<b>Material studies on the Dead Sea scrolls</b> <u>I. Rabin</u> , O. Hahn, T. Wolff, A. Masic, and G. Weinberg
14:50	O26	<b>A diffusion study of medieval ferrous products using trace elements microanalyses: the case of Italian armours</b> <u>S. Leroy</u> , P. Dillmann, B. Gratuze, R. Simon, L. Bertrand, A. Williams and P. Fluzin
15:10	O27	<b>Investigation of celtic ceramic sherds with a laboratory 3D micro x-ray fluorescence spectrometer</b> <u>C. Seim</u> , L. Lühl, S. Steiner and B. Kanngießer
15:30		Coffee Break
15:50-16:30		<b>DIAGNOSTIC TECHNIQUES IN CONSERVATION</b> <i>Session chair: H. Breccoulaki</i>
15:50	O28	<b>The monitoring of indoor museum environments and the impact of their conservation of their corrosivity on complex organic materials</b> <u>M. Odlyha</u> , S. Jakiela, C. Theodorakopoulos, J.M. Slater, R. Campana, S. Kutsarova, C.J. Bergsten, A. Cavicchioli, D.L.A. de Faria, A. Niklasson, J.-E. Svensson, T. Grontoft, E. Dahlin and M. Scharff
16:10	O29	<b>The use of Near Infrared spectroscopy to characterize the state of historic silks</b> <u>P. Garside</u> , J. Kim and P. Wyeth
16:30	O30	<b>Preliminary study on the wood from an ancient roman rostrum</b> E. Caponetti, <u>F. Caruso</u> , C. Di Stefano, M. L. Saladino, A. Spinella, P. Tisseyre and S. Tusa
16:50	O31	<b>EDXRF and FTIR combined studies of archaeological artworks in Crete</b> <u>N. Maravelaki</u> and N. Kallithrakas-Kontos
17:30		Tour to Acropolis



**Wednesday, 29 April 2009**

**9:00-10:30 MOBILE SPECTROSCOPY I**

*Session chair: A. Nevin*

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- 9:00 O32 **The IAEA activities related to applications of nuclear analytical techniques for characterization and protection of cultural heritage objects**  
Invited A. Markowicz, D. Wegrzynek and E. Chinea-Cano
- 9:30 O33 **Quantitative X-ray fluorescence analyse of an Egyptian faience pendant and comparison with PIXE**  
L. De Viguerie, A. Duran, A. Bouquillon, V. A. Sole, J. Castaing and P. Walter
- 9:50 O34 **Novel extensions of pulsed Raman and laser induced breakdown spectroscopy (LIBS) in art conservation**  
I. Osticioli, N.F.C. Mendes, S. Porcinai, A. Cagnini and E. M. Castellucci
- 10:10 O35 **A novel portable XRF spectrometer: first application to a gilded bronze from the Florence baptistery**  
A. Migliori, P. Bonanni, N. Grassi and P.A. Mando
- 10:30 Coffee break
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**11:00-12:50 ORGANIC MATERIALS**

*Session chair: C. Milliani*

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- 11:00 O36 **Macromolecules in art and archaeology**  
M.P. Colombini
- 11:30 O37 **From egg tempera to oil on canvas: Analytical study of the evolution of the Post-Byzantine techniques**  
E. Kouloumpi, G. Lawson and V. Pavlidis
- 11:50 O38 **Coloured glazes on silver leaf: Identification of the protein media used in the grounds and coatings**  
C. Tokarski, M. Richter, S. Schafer, N. Garnier and C. Roland
- 12:10 O39 **Parchment characterization and deterioration assessment using optical methods**  
B. Dolgin, Y. Chen, V. Bulatov and I. Schechter
- 12:30 O40 **Comparison of extraction methods for the analysis of natural dyes in historical textiles by HPLC**  
I. Karapanagiotis, L. Valianou and C. Chryssoulakis
- 12:50 Lunch break



Wednesday, 29 April 2009

14:00-15:30 **MOBILE SPECTROSCOPY II**

*Session chair: S. Siano*

14:00 O41 **The new version of the portable XRD system of the LANDIS laboratory and its application for the non-destructive characterization of ancient pigments**  
Invited F.P. Romano, G. Pappalardo, L. Pappalardo, F. Rizzo and G. Gatto Rotondo

14:30 O42 **A portable, vacuum-chamber equipped XRF-instrument, designed for the sophisticated needs of the KHM, Vienna**  
K. Uhlir, G. Buzanich, M. Griesser, C. Strel, P. Wobrauschek, D. Wegrzynek, A. Markowicz and E. Chinea-Cano

14:50 O43 **A combined use of FORS, XRF and Raman spectroscopy in the study of mural paintings in the Aosta valley (Italy)**  
L. Appolonia, D. Vaudan, V. Chatel, M. Aceto and P. Mirti

15:10 O44 **Micro-XRF and LIBS analysis of gilded bronze figurines at the national archaeological museum of Damascus**  
V. Kantarelou, A. G. Karydas, D. Sokaras, A. Giakoumaki, D. Anglos, L. Mahfoud, A. Kurdab, M. Azar, A. Almansour and J. Alshehne

15:30 Coffee Break

15:50-17:10 **COMBINED ND TECHNIQUES**

*Session chair: E. Aloupi*

15:50 O45 **Reliability of optical microscopy, X-Ray diffraction and X-Ray fluorescence for studying tesserae from mosaics**  
V. Perdikatsis, Ch. Apostolaki, V. Kantarelou

16:10 O46 **Using Micro-XRF and Raman Spectroscopy for non-invasive analysis of Artworks: techniques and applications**  
E. Lancelot

16:30 O47 **Multitechnique characterization of lapis lazuli for provenance study by means of Ionoluminescence**  
A. Lo Giudice, M. Albonico, S. Calusi, E. Colombo, E. Conz, L. Giuntini, M. Massi, P. Olivero, G. Pratesi, A. Re and E. Vittone

16:50 O48 **The use of a diamond cell for the FTIR characterization of binding and pigments in contemporary paintings**  
Z.E. Papliaka and E.A. Varella

17:10-18:30 **POSTER SESSION II**

*Session chairs: M. Castillejo, Z. Kis*

21:00 Gala Dinner

## Thursday, 30 April 2009

9:00-13:30		<b>SENSING AND SPECTROSCOPY</b> <i>Session chair: K. Polikreti</i>
9:00	O49 Invited	<b>Non destructive identification of art objects using multispectral images and spectra combined with acoustic microscopy</b> <u>G. Karagiannis</u>
9:30	O50	<b>Principal component analysis of reflectance medium infrared spectra for the non-invasive identification of organic materials in wall paintings</b> A. Daveri, F. Rosi, <u>C. Miliani</u> , G. Verri, P. Benedetti, B. Brunetti and F. Pique
9:50	O51	<b>Second and third harmonic generation measurements of glues used for lining of painted artworks</b> <u>G. Filippidis</u> , K. Melessanaki and C. Fotakis
10:10	O52	<b>Micro-fading spectrometry: investigating the wavelength specificity of fading</b> <u>A. Lerwill</u> , A. Brookes, J. H. Townsend, H. Liang, J. Thomas and S. Hackney
10:30		Coffee break
11:00-12:40		<b>ION-BEAM ANALYSIS AND COMPLEMENTARY TECHNIQUES</b> <i>Session chair: G. Pappalardo</i>
11:00	O53	<b>Analysis of Venetian-type glass from Lezha, Albania</b> <u>Ž. Šmit</u> , F. Stamat, N. Civici, A. Vevecka, M. Kos and D. Jezeršek
11:20	O54	<b>Elemental analysis of ancient glass beads by means of combined ion-beam and synchrotron-based analytical tools</b> D. Sokaras, A. G. Karydas, <u>A. Oikonomou</u> , N. Zacharias, K. Beltsios, V. Kantarelou, L. Lühl, B. Hesse, I. Mantouvalou and B. Kanngießer
11:40	O55	<b>Croatian Apoxiomenos – metal composition and lead provenance study</b> <u>D. Mudronja</u> , M. Jakšić, S. Fazinić, I. Božičević, V. Desnica, <u>Ž. Pastuović</u> , D. Krstić, J. Woodhead and Z.A. Stos-Gale
12:00	O56	<b>The hoard of Beçin - non-destructive analysis of the silver coins</b> <u>M. Rodrigues</u> , M. Schreiner, M. Melcher, M. Guerra, J. Salomon, M. Radtke, M. Alram and N. Schindel
12.20	O57	<b>Non-destructive determination of the silver content in Roman coins dated to 308-311 A.D. by combined use of the PIXE-alpha, XRF and DPAA techniques</b> <u>F. Rizzo</u> , G.P. Cirrone, G. Cuttone, A. Esposito, S. Garraffo, G. Pappalardo, L. Pappalardo, F.P. Romano and S. Russo
12:40		Lunch break

Thursday, 30 April 2009

14:00-15:30 **X-RAY MICROANALYSIS AND COMPLEMENTARY TECHNIQUES**  
*Session chair: P. Mirti*

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- 14:00 O58  **$\mu$ -EDXRF and XRD on lead-based glazes**  
Invited M.L. Carvalho, A. Guilherme and J. Coroado
- 14:30 O59 **Important considerations on applying X-Ray microanalysis techniques for damage assessment of outdoor copper based monuments**  
V. Argyropoulos, A. Vossou, K. Polikreti, D. Charalambous, I. Sianoudis, A.G. Karydas, V. Perdikatsis, S. Bittner and M. Mach
- 14:50 O60 **EDXF imaging of Pb depth penetration in glazed ceramics using a micropattern gas detector**  
A.L.M. Silva, J.F.C.A. Veloso, C.A.B. Oliveira, A.L. Gouvêa, J.M.F. dos Santos and M.L. Carvalho
- 15:10 O61 **Indonesian painting: Characterization of modern Balinese painting by Raman microscopy**  
M. R.. Marcelino, S. Lopes and V.S.F. Muralha
- 15:30 O62 **Use of X-Ray-based microanalytical methods for explanation of origin and corrosion of copper-based pigments**  
S. Svarcova, D. Hradil, J. Hradilova, E. Kotylanova and P. Bezdicka



**POSTER SESSION I**  
**Monday 17:30-19:00**

**Optics and Lasers**

- P1 THE ITALIAN PAINTING OF THE 17TH CENTURY CONTRIBUTIONS OF A NON-DESTRUCTIVE INVESTIGATION**  
C. FRANCESCHI, E. FRANCESCHI and S. VASSALLO
- P2 SEC/MALLS TECHNIQUE IN PAPER DEGRADATION STUDIES**  
T. ŁOJEWSKI and K. ZIĘBA
- P3 ASSESSING EARLY PHOTOSYNTHETIC GROWTH ON MONUMENTS BY IN VIVO CHLOROPHYLL FLUORESCENCE**  
A.Z. MILLER, A. DIONÍSIO, M.F. MACEDO and C. SAIZ-JIMENEZ
- P4 CHARACTERIZATION OF DAMAGES INDUCED BY LIBS ANALYSIS ON ARCHAEOLOGICAL OBJECTS USING OPTICAL PROFILOMETRY**  
G. NICOLAS, T. CTVRTNICKOVA and M.P. MATEO
- P5 A NEW SPECTRAL IMAGING APPROACH FOR THE IN-SITU ASSESSMENT OF THE CLEANING INTERVENTION ON STONWORK**  
A. LOUKAITI, V. PAPADAKIS and P. POULI
- P6 NON-DESTRUCTIVE DEPTH-PROFILING OF PHOTO-AGED DAMMAR VARNISH USING SPECTROSCOPIC ELLIPSOMETRY**  
K. POLIKRETI and C. CHRISTOFIDES

**Neutrons**

- P7 POTSDERDS FROM THE INNER MONGOLIA**  
R. GILLES, Y.M. SIOURIS, W. KOCKELMANN, M. HOELZEL, D. VISSER and M. BRUNELLI
- P8 ARCHAEOOMETRY RESEARCH OF LITHIC RAW MATERIALS FOR EARLY NEOLITHIC PREHISTORIC COMMUNITIES WITH PGAA**  
ZS. KASZTOVSZKY, K. T. BIRÓ, A. MARKÓ, T. TEZAK-GREGL, M. BURIC and R. SOSIC
- P9 RADIOGRAPHY DRIVEN PGAI AND NEUTRON DIFFRACTION MEASUREMENTS ON TEST OBJECTS DESIGNED FOR THE 'ANCIENT CHARM' PROJECT**  
Z. KIS, L. SZENTMIKLÓSI, T. BELGYA, ZS. KASZTOVSZKY, W. KOCKELMANN, G. FESTA, A. KIRFEL, P. KUDEJOVA, R. SCHULZE, K. T. BIRÓ, K. DÚZS, ZS. HAJNAL and D. VISSER
- P10 CHARACTERIZATION OF ARCHAEOLOGICAL CERAMICS FROM ARGENTINE NORTHERN PATAGONIA USING NEUTRON ACTIVATION ANALYSIS**



R.R. PLÁ, V. ALDAZÁBAL, R. INVERNIZZI and M. MORENO

- P11** **ARCHAEOMETRIC STUDY OF CERAMIC MATERIALS FROM BOLSÓN DE FIAMBALÁ AND CHASCHUIL PUNA IN NORTHWESTERN ARGENTINA**  
R.R. PLÁ, N. RATTO, M. MORENO, R. INVERNIZZI and A. FEELY
- P12** **TOF-ND AND LIPS COMBINED STUDIES OF ANCIENT BRONZE FIGURINES**  
S. SIANO, J. AGRESTI, L. BARTOLI, A.A. MENCAGLIA, A. RASTRELLI and M. MICCIO
- P13** **NON-DESTRUCTIVE CHARACTERISATION OF SILVER/COPPER COINS USING TOF NEUTRON DIFFRACTION**  
I. M. SIOURIS, W. KOCKELMANN and V. POULIOS
- P14** **METHODOLOGY FOR LARGE SAMPLE NEUTRON ACTIVATION ANALYSIS OF CULTURAL HERITAGE OBJECTS**  
F. TZIKA, T. VASILOPOULOU and I.E. STAMATELATOS

### **Synchrotron Radiation**

- P15** **STUDY OF METALLIC COMPONENTS OF HISTORICAL ORGAN PIPES THROUGH SYNCHROTRON RADIATION X-RAY MICROFLUORESCENCE IMAGES AND GRAZING INCIDENCE X-RAY DIFFRACTION**  
L.K HERRERA, A. JUSTO, A. MUÑOZ and G. MARTINEZ-CRIADO
- P16** **STUDY OF JOSEFA D'OBIDOS AND BALTAZAR GOMES FIGUEIRA PAINTINGS BY FTIR AND IN-SITU AND SYNCHROTRON XRF: ASSIGNING AUTORSHIP?**  
A. GUILHERME, S. PESSANHA, M.L. CARVALHO, S. VALADAS, T. FERREIRA, C.T. COSTA, A. CANDEIAS, J. CAETANO, R. SIMON and J. MIRÃO
- P17** **COMPOSITION OF ROMAN MURAL PAINTINGS FROM SOUTHERN PORTUGAL: SOURCES, COLOUR AND CONSERVATION**  
A. CANDEIAS, A. GUILHERME, S. PESSANHA, M.L. CARVALHO and J. MIRÃO
- P18** **EVALUATION OF CONSOLIDATION TREATMENTS ON WATERLOGGED ARCHAEOLOGICAL WOOD BY MEANS OF SYNCHROTRON LIGHT X-RAY MICROTOMOGRAPHY**  
S. BUGANI, S. CAGNO, P. CLOETENS, M.P. COLOMBINI, G. GIACHI, K. JANSSENS, J.J. ŁUCEJKO, F. MODUGNO and L. MORSELLI

## Diagnostic Techniques in Conservation

- P19 LASER CLEANING OF AGED SHELLAC FROM WOOD**  
M. ALIGIZAKI, A. POURNOU, K. MELESSANAKI
- P20 AN EVALUATION OF REFLECTANCE-ABSORPTION INFRA RED SPECTROSCOPY FOR IN SITU INVESTIGATION OF ORGANIC COATINGS ON CORRODED METALS**  
S. C. BOYATZIS, V. ARGYROPOULOS, A. SIATOU, K. POLIKRETI, D. CHARALAMBOUS and A.M. DOUVAS
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