Universität Hamburg
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CENTRE FOR THE STUDY OF MANUSCRIPT CULTURES

The Centre for the Study of Manuscript Cultures (CSMC)

cordially invites you to the workshop

Coloured Inscriptions and Analytical Techniques

Tuesday, 19 October, 02:00 pm – 05:20 pm CEST

Zoom-Meeting

Registration:
https://www.csmc.uni-hamburg.de/en/register-workshop12

Colouring paintings has been a well-known procedure since Ancient Times, aiming to enhance the appearance of an object, such as rock-based written artefacts, sculptures, ceramic pots, et cetera. In particular, writing can be perceived more clearly or be obscured, it can be emphasised or put in the background by using different colours. Colour can also be added to express feelings and highlight details of daily life, and thus coloured cultural-heritage objects can reveal peculiar characteristics of societies. The application of material-science analytical methods to colours and in particular to mineral-based pigments is vital to gain information about the structure and crystallo-chemical composition of the pigment components, which are key factors in studying the origin and the conservational history of a coloured object. Of critical importance is the use of non-destructive analytical methods, as sampling of pigments is undesirable or forbidden for most historical objects.

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Programme

Session 1: 02:00 pm – 03:25 pm CEST

Chair: Boriana Mihailova and Stelios Aspiotis (Hamburg)

02:00-02:05	Boriana Mihailova (Hamburg): *Welcome and opening remarks*
02:05-02:40	Giancarlo Della Ventura (Rome): *Blue pigments: a perfect argument for teaching mineralogy*
02:40-03:15	Armida Sodo (Rome): *Pigments degradation processes in mural paintings: an overview*
03:15-03:25	*Coffee break*

Session 2: 03:25 pm – 05:20 pm CEST

Chair: Boriana Mihailova and Stelios Aspiotis

03:25-04:00	Philippe Colomban (Paris): *Non-invasive on-site identification of colouring agents. Complementarity of mobile Raman and XRF spectroscopies*
04:00-04:35	Claudia Conti (Milan): *Unveiling the presence of subsurface pigments non-invasively with Micro-Spatially Offset Raman Spectroscopy*
04:35-05:10	Andrew Beeby (Durham): *to be announced*
05:10-05:20	General discussion and closing remarks

Abstracts and Contributors

Giancarlo Della Ventura (Rome): *Blue pigments: a perfect argument for teaching mineralogy* (02:05 pm-02:40 pm CEST)

Abstract: Pigments are by far the most fascinating topic in material science, involving art, archaeology, colour theory, geology, geo-resources, chemistry, physics, et cetera. For this reason, they represent a perfect argument for teaching mineralogy, giving the opportunity to introduce to the younger generations the link between natural materials and the development of human abilities and technology. In this presentation, I will talk about my educational activities regarding the synthesis and mineralogical characterisation of blue pigments like Egyptian blue, lapis-lazuli, and their natural counterparts.

Giancarlo Della Ventura is Professor of Mineralogy at the University Roma Tre, Department of Science (Dipartimento di Scienze, Università di Roma Tre). He recieved his PhD degree in Mineralogy from the University of Orleans (Università di Orléans, France). His main research interests are crystal chemistry and transformation processes in diversity of minerals, including amphiboles, micas, asbestos, and mineral pigments, by applying various analytical methods such as infrared and Raman spectroscopy, X-ray diffraction (XRD), electron microprobe analysis (EMPA), and Mössbauer spectroscopy. He has published more than 230 papers and numerous conference contributions. Prof Della Ventura is a Fellow of the *Mineralogical Society of America (MSA),* Special Editor of *Minerals* and Associate Editor of the *Mineralogical Magazine* and *Canadian Mineralogist*.

Armida Sodo (Rome): *Pigments degradation processes in mural paintings: an overview* (02:40 pm-03:15 pm CEST)

Abstract: Wall paintings represent one of the oldest artistic expressions of humanity. An interdisciplinary and multi-techniques approach can give important information to understand the evolution of the execution techniques, to characterise the used materials, and to investigate pigment degradation mechanisms that could, in some cases, compromise the readability of the works of arts. Specific case studies referring to different geographical areas and to different historical periods are reported to illustrate the main degradation processes and the most common conservation treatments.

Armida Sodo is a senior researcher at Roma Tre University, Department of Sciences (Dipartimento di Scienze, Università Roma Tre) and is responsible of the Raman Spectroscopy Laboratory. She graduated in Chemistry at Sapienza University and in 2003 received

her PhD in Chemical Physics at the same university. Dr Sodo participated as post-doctoral fellow and researcher in several international projects, which were funded by INFM (Istituto Nazionale di Fisica della Materia, Rome), ESRF (European Synchrotron Radiation Facility, Grenoble) and Roma Tre University. Her current research activities include the Raman spectroscopic investigation of geological materials and its applications to cultural heritage, the study of nanoparticles-based coatings for stone conservation with various analytical techniques (IR, Raman spectroscopy, XRD, time-of-flight secondary ion mass spectrometry, et cetera), as well as the application of surface-enhanced Raman spectroscopy (SERS) to thyroid cancer diagnosis. She has published more than 110 articles and presented her research in more than 50 international conferences.

Philippe Colomban (Paris): *Non-invasive on-site identification of colouring agents. Complementarity of mobile Raman and XRF spectroscopies* (03:25pm-04:00pm)

Abstract: Coloured materials are the basis of many expressions of human craft, artistic and religious genius. The continuous miniaturisation of radiation sources and detection systems for nearly 20 years has resulted in mobile instruments that perform close to that of laboratory devices. The constraints of on-site implementation and non-invasive use as well as the intrinsic weaknesses of mobile devices must be compensated for by establishing appropriate procedures. Based on the examples of enamelled objects, in particular those with sophisticated decorations (metal, glass or ceramic objects) and rock art paintings, we show the complementarity of Raman (μRaman) and X-ray fluorescence (pXRF) spectroscopies and present the procedures defined to identify the colouring agents and the crystalline or amorphous phases present in the coloured layer and the substrate, in order to document the objects (dating, state of conservation, authenticity) and exchange routes between production and/or use centres.

Philippe Colomban is a Research Director at CNRS (Centre National de la Recherche Scientifique) and a Professor Emeritus at Sorbonne University (MONARIS Laboratories). Professor Colomban graduated in Ceramic Engineering in 1975 as well as in Solid State Physics in 1976 from the Ecole Nationale Supérieure de Céramiques Industrielles (Sèvres). He received the Hab. Ph.D. degree (Docteur es-Sciences Physiques) from the Université Pierre et Marie Curie in 1979. For many years, Prof Colomban consulted the French Science and Technology Minister in charge of passive components and materials for electronics and was coordinator or consultant of projects at the Materials Department of ONERA, the French Establishment for Aerospace Research and Development (1989-2003). His main research interests include Raman and infrared spectroscopy, inelastic neutron scattering, X-ray fluorescence (XRF) analysis of nanostructured functional materials (ferroic oxides, polymers, fibers, composites, ceramics, et cetera), and pigments

on metal, glass, ceramics, pottery, and porcelains. Prof Colomban has published more than 800 papers and reviews and contributed frequently to international scientific conferences. He is an Associate Editor of *Journal of Raman Spectroscopy* and member of the Editorial Board of the *Journal of Cultural Heritage*.

Claudia Conti (Milan): *Unveiling the presence of subsurface pigments non-invasively with micro-spatially offset Raman spectroscopy* (04:00pm-04:35pm CEST)

Abstract: Micro-spatially offset Raman spectroscopy (micro-SORS) has turned out to be an effective analytical method for the non-invasive detection of compounds located below the surface of highly diffusing scattering materials. In the field of art, micro-SORS demonstrated its potential in reconstructing painted layer sequences, in identifying hidden decay products, and in studying and monitoring the absorption and diffusion processes in conservation procedures. In this presentation, a brief overview of micro-SORS principles and applications will be given.

Claudia Conti is a senior researcher at the Institute of Heritage Science (ISPC) of the National Research Council (Italy). She graduated from the University of Perugia and received her PhD degree in Materials Engineering from the Politecnico di Milano (Italy) in 2010. From 2008 to 2017, she was a Research Investigator at the National Research Council, Institute for the Conservation and Valorization of Cultural Heritage (Unit of Milan) and for a short period a visiting scientist at STFC Rutherford Appleton Laboratory, Central Laser Facility (UK). Her research activities are characterised by a highly multidisciplinary approach dealing with the fields of physical and chemical sciences applied to the conservation of cultural heritage. The prominent development of a new Raman method, namely micro-scale spatially offset Raman spectroscopy for the non-invasive subsurface investigation of cultural heritage materials, led her to win the 2020 Craver Award presented by the Coblenz Society for her significant contributions in applied analytical vibrational spectroscopy. Last but not least, she is the author of almost 100 peer-reviewed publications and conference papers and is member of the *Analyst* Advisory Board.

Andrew Beeby: *to be announced* (04:35pm-05:10pm CEST)

Abstract: to be announced

Andrew Beeby is Professor in Chemistry at Durham University. He graduated from the University of East Anglia (UK) and received his PhD degree in Chemistry from the same

university in 1987. His main research interests are in the field of photochemistry and photophysics, studying photo-induced reactions, such as energy transfer, electron transfer, and isomerisation in various light-emitting materials. His knowledge on analysing functional materials by photoluminescence, optical absorption, diffuse reflectance spectroscopy, and Raman imaging is further transferred to identify pigments in Medieval manuscripts. He has authored more than 175 publications, has contributed frequently to international scientific conferences, and has given numerous invited talks.