

# EWCHP-2013

EWCHP-2013  
3<sup>rd</sup> European Workshop  
on Cultural Heritage Preservation  
Bozen / Bolzano, Italy, September 16 to 18, 2013

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AFTERNOON SESSION 13:00 to 17:00

## NanoMaterials for cultural heritage (NanomeCH cluster)

### Cluster NanomeCH: Introduction to NanomeCH Cluster

**Coordinator: Adriana Bernardi** (15 min)

The organization, focus and activities of “*NanomeCH CLUSTER*“ will be presented.

### Working Group 2 NanomeCH: INNOVATIVE TECHNOLOGIES AND TOOLS

#### EU project NANOMATCH - Alkaline-earth metal alkoxides innovative conservation materials for stone and wood: syntheses and properties of the alkaline-earth metal alkoxides

**Monica Favaro and Matteo Chiurato** (35-40 min)

Metal alkoxides belong to a well known class of chemicals sensitive to atmospheric conditions and moisture. Their decomposition products give different forms of carbonates, that in the case of Ca/Mg derivatives can be used as consolidants for carbonatic stones and that can also be employed as alkaline reserve in wood. Metal alkoxides history, some structures, their chemical-physical properties, their reactivity, their behavior and different synthetic pathways to obtain these species will be presented. The characteristic of the coating of some metal alkoxides are investigated; particularly attention will be reserved to the parameters (solvent, temperature, H.R., ...) that can drive the carbonatation process to different forms of carbonates and the behavior of these reactions and coatings will be described.

#### EU project NANOMATCH - Application of calcium alkoxides as conservative materials on stone and wood. Preliminary results and perspectives

**Martin Labouré** (35- 40 min)

Application methodologies of Innovative metal alkoxides for treatment of different kind of stones and wood species have been tested and most suitable ones selected for the treatment of those materials. A scientific campaign is currently on-going to assess their performance as conservative products. Results on the performance assessment of solutions and sols of metal alkoxides will be presented together with examples of first application on different European historical sites.

#### EU project NANOFORART – Innovative nanostructured systems for cleaning, consolidation, and deacidification of movable and immovable artworks

**Rodorigo Giorgi** (30 min.)

In the context of the NANOFORART project (Nano-materials for the conservation and preservation of movable and immovable artworks), new nano-materials and responsive systems have been developed and experimented for the preservation of works of art. The main challenge is the combination of functional materials arising from the recent developments in nano-science with innovative techniques in the restoration of works of art. The

research activity has been focused on the development of manageable methodologies, based on nanosized structures and with a low environmental impact. The main results include the production of dispersions of nanoparticles (hydroxides) for consolidation of wall paintings and limestones, and deacidification of paper and canvas, and the formulation of cleaning systems based on micellar solutions, microemulsions and gels. These systems offer new reliable pathways to restore works of art by combining the main features of soft and hardmatter systems for cultural heritage conservation. Conventional materials, in fact, often lack the necessary compatibility with the original artworks and a durable performance in responding to the changes of natural environment and man-made activities.

#### **Working Group 5 NanomeCH: - ENVIRONMENT AND HEALTH IMPACT**

##### **EU project NANOMATCH - on site measurements of climatic parameters**

**Francesca Becherini** (20 min)

The efficiency of the innovative metal alkoxides is being evaluated in 4 different European historical sites characterized by different climate. Substrate models and real surfaces treated with the metal alkoxides have been exposed on the field and the main climatic/microclimatic parameters are being collected nearby the exposure locations in order to study the effect of the environment on the performance of the treatments. The methodology followed for the field exposure tests will be described and the preliminary results presented.

At the same time, the impact of the use of metal alkoxides in sols and solutions on human health and environment, including the eventual release of nano-particles after application will be assessed through laboratory tests. Applications guidelines for the use of the newly developed nanostructured materials will be provided at the end of the project.

#### **Working Group 3 NanomeCH: TECHNOLOGY TRANSFER AND MARKET OPPORTUNITY**

##### **EU project PANNA: Atmospheric pressure plasma for the cleaning of CH assets and deposition of protective coatings**

**Alessandro Patelli** (35-40min)

Plasma is a ionized gas full of reactive species able to reduce or oxydise deterioration products on CH surfaces. Basics of plasma together with possible applications of this novel technique in the field of conservation will be addressed.

##### **“EU project PANNA Cleaning trials with commercial plasma torches on different deteriorated surfaces. Preliminary results and perspectives**

**Stefano Voltolina** (35-40 min)

Advantages and drawbacks of different commercially available plasma devices, used on different stone, metal and wall painting substrates, for the removal of polymers, graffiti, organic and inorganic dirt will be presented.

#### **Working Group 6 NanomeCH: OPPORTUNITIES FOR SMES**

##### **EU project NANOMATCH and PANNA-Opportunities for SMEs**

**Luc Pockelé** (20m)

The projects NANOMATCH and PANNA both enjoy a large presence of SME's in their consortium. Participating in such projects as SME's provide the occasion to contribute to and to acquire knowledge and expertise on the latest technologies under development. At the same time, opportunities for subsequent exploitation of this knowledge and expertise are present in each of the areas of activity of the participating SME's. e.g. manufacturing, distributing and using the alkoxide-based consolidants being developed in NANOMATCH and of the plasma-torch and its applications being developed in PANNA.

**Target:** scientists in CH, restorers, end users, policy makers in CH , sellers of products for CH, material science/scientists, chemist/chemistry, physic/physics