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# BOOK OF ABSTRACT

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## #P071 - Qualitative and quantitative characterization of historical pigments by XRF spectrometry

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In the Cultural Heritage field, the study of the pigments covers a crucial role, both for historical-artistic and diagnostic reasons; indeed most of the historical paints are mainly constituted by inorganic pigments, either pure or mixed, spread on the surfaces using different binding agents [1]. The knowledge of the exact amount of different constituents of the paint, as well as of the mixing and pictorial techniques, is crucial for a careful program of conservation of polychrome works. Moreover, since the availability of these pigments has been changing through the centuries, their identification and chemical characterisation is useful to acquire or deepen information about the artist and his/her work. This information can also be useful for authentication purposes through relative dating because the identification of one pigment respect to another one can be used as a *terminus post quem* or *ante quem* the artwork was realized.

On the basis of the before considerations, this work is focused on the chemical characterization and quantitative analysis of binary mixtures obtained by mixing historical pigments: cinnabar, lapis lazuli, lead-tin yellow and chalk white. They were analysed both in pure and mixed form, by varying their weight percentage, in order to produce binary mixtures [2] (realized following the Itten Theory and the ancient artists recipes) to be investigated by means of a portable XRF spectrometer in order to carry out qualitative and quantitative analyses of the two pigments constituent the mixture [3].

This experimental approach allows calculating the weight percentage of the single component, on an unknown (for the analyst) mixture, composed by two known pigment, by inverse prediction on the calibration curve.

## #P072 - Facile growth and transfer of high quality graphene layers by simple thermal treatments

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Graphene growth is nowadays achievable by a wide variety of techniques. We demonstrate the possibility to grow high quality graphene single and few layers by using simple and economic UHV thermal treatments of thin (100-150 nm thick) nickel films deposited on Si/SiO2 (300 nm) substrates and nickel foam. The crucial role played by process parameters to trigger the graphene growth yield as well as the overall film quality has been extensively investigated. In particular, hypothesis on the growth mechanism is given in comparison with literature reports, with particular attention devoted to the effect of external carbon sources and process pressure on single layer growth. Raman mapping confirms the presence of domains of turbostratic multi-layer areas as well as single layer graphene islands as large as several um. SEM and AFM analyses allow for a detailed morphological characterization of nickel film after annealing process and the observed anomalous grain growth seem to be correlated to graphene formation. The as grown graphene layers can be further transferred onto any kind of substrate by wet methods. We conclude that UHV annealing of nickel film and foam represent a valuable approach to provides graphene-based materials for sensors and devices.

## #P073 - Multiphoton k-resolved photoemission from gold surface states with 800-nm femtosecond laser pulses

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We measure direct multiphoton photoemission of the Au(111) surface state with 800-nm laser pulses. We observe the parabolic dispersion in the angular distribution of photoelectrons having absorbed between four and seven photons. The k|| dispersion we measure can be explained in terms of Shockley-state replicas, with a nascent hot electrons distribution at k|| above the Fermi level. Moderate laser power densities, of the order of $100 GW/cm^2$, resulted in large electron yields, indicating the importance of multiphoton excitations to define the electronic and magnetic properties of matter in the first hundred femtoseconds after laser excitation [Phys. Rev. B 2014, *90*, 035401].