Programme and Book of Abstracts

3rd Joint AIC - SILS Conference - Rome 25-28 June 2018

14:00-14:20: **SF2** F. Bertolotti (AIAS, Aarhus Univ. DK - To.Sca Lab, Uninsubria Como) "DebUsSy 2.0 - A powerful tool for characterizing structure, microstructure and morphology of nanomaterials through the Debye Scattering Equation"

14:30-16:30: **MS3 & MS4**

MS3 - Crystal-chemical behaviour in Mineralogy and Materials Science
Chairs: S. Nazzareni, G. Giuli | Location: ***Aula Convegni***

14:30-15:00: **KN1** M. Ardit (Univ. di Firenze) "New insight into the thermodynamic properties of high silica ZSM-5 zeolite: effect of adsorbed organic molecules"
15:00-15:30: **KN2** M. Merlini (Univ. di Milano) "Complex structures and crystal chemistry of minerals at deep Earth conditions"
Selected Short Talks
15:30-15:50: **O1** D. Medas "From pressure to impact of metals to the environment: synchrotron techniques to unravel biomineralization mechanisms"
15:50-16:10: **O2** L. Bindi "Solid solution: can this concept be applied to quasicrystals?"
16:10-16:30: **O3** F. Nestola "Super-deep diamonds: recent advances"

MS4 - Methodological and experimental developments in crystallography and synchrotron techniques, *in memory of Davide Viterbo*
Chairs: R. Rizzi, G. Aquilanti | Location: ***Aula Marconi***

14:30-15:00: **KN1** A. Altomare (IC-CNR) "Advanced methods for solving crystal structure by powder diffraction data"
15:00-15:30: **KN2** L. Gregoratti (ELETTRA) "Bridging the material and pressure gap in synchrotron based photoelectron in situ/operando studies"
Selected Short Talks
15:30-15:50: **O1** D. Moscheni "Modeling stacking faults in colloidal quantum dots"
15:50-16:10: **O2** F. Bardelli "Combining synchrotron radiation phase-contrast and fluorescence nanotomography to reveal the morphology and elemental composition of biological samples: the case of asbestos bodies"
16:10-16:30: **O3** M. Giorgetti "MRC-ALS for the Operando XAFS data analysis of Batteries"

16:30-17:00 *Coffee Break*

17:00-18:30 **AIC Members Assembly -** Location: ***Aula Convegni***

17:00-18:30 **SILS Awards and Prizes**
Chairs: A. Di Cicco | Location: ***Aula Marconi***

17.00-17.15 "Best PhD Thesis Awards" I. Carlomagno (Univ. Roma 3)
17.15-17.30 "SILS young researcher Award" P. Dolcet (KIT, Karlsruhe)
17.30-18.00 "SILS Outstanding scientist award" A. Bravin (ESRF, Grenoble)
18.00-18.30 "SILS lifetime achievement award" A. Bianconi (RicMass)

Wednesday, June 27

9:00-10:00: **Plenary Lecture 3** (Chair: G. Zanotti)

MS4 - O2: Combining synchrotron radiation phase-contrast and fluorescence nanotomography to reveal the morphology and elemental composition of biological samples: the case of asbestos bodies

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Imaging techniques exploiting synchrotron radiation have several advantages compared to the same techniques based on conventional X-ray sources. In particular, X-ray phase-contrast and X-ray fluorescence computed tomography (respectively XPC-CT and XRF-CT) can nowadays be operated with a resolution down to 10nm and a sub-ppm sensitivity [1,2]. Other than the resolving power, an advantage of XPC-CT, respect to conventional X-ray absorption tomography, is the ability to image law absorbing materials with similar densities, as is the case of biological tissues, or to image low and high absorbing materials at the same time. An additional advantage of exploiting synchrotron radiation is the possibility of combining diverse imaging techniques to obtain complementary information. In particular, the combination of phase-contrast and fluorescence tomography allows obtaining a more reliable elemental quantification, because the local thickness and density of samples with *a priori* unknown composition can be obtained from phase-contrast tomography and used in combination with fluorescence data [3–5]. As an example of the potentiality of this approach, the case of the asbestos bodies, i.e. the ensemble of asbestos fibers and the ferruginous coating they develop in biological medium [6], will be discussed.

[1] B. De Samber, E. Meul, B. Laforce, B. De Paepe, J. Smet, M. De Bruyne, et al. Nanoscopic X-ray fluorescence imaging and quantification of intracellular key-elements in cryofrozen Friedreich's ataxia fibroblasts *PLoS One.* **2018** 13, 1–24.
[2] A. Cedola, A. Bravin, I. Bukreeva, M. Fratini, A. Pacureanu, A. Mittone, et al. X-Ray Phase Contrast Tomography Reveals Early Vascular Alterations and Neuronal Loss in a Multiple Sclerosis Model *Sci. Rep.* **2017** 7, 1–11.
[3] Gramaccioni C, Yang Y, Procopio A, Pacureanu A, Bohic S, Malucelli E, et al. Nanoscale quantification of intracellular element concentration by X-ray fluorescence microscopy combined with X-ray phase contrast nanotomography *Appl. Phys. Lett.* **2018**, 112
[4] E. Malucelli, S. Iotti, A. Gianoncelli, M. Fratini, L. Merolle, A. Notargiacomo, et al. Quantitative chemical imaging of the intracellular spatial distribution of fundamental elements and light metals in single cells *Anal. Chem.* **2014** 86, 5108–15.
[5] E. Kosior, S. Bohic, H. Suhonen, R. Ortega, G. Devès, A. Carmona, et al. Combined use of hard X-ray phase contrast imaging and X-ray fluorescence microscopy for sub-cellular metal quantification *J. Struct Biol.* **2012** 177, 239–47.
[6] F. Bardelli, G. Veronesi, S. Capella, D. Bellis, L. Charlet, A. Cedola, et al. New insights on the biomineralisation process developing in human lungs around inhaled asbestos fibres. *Sci Rep.* **2017**, 7.