

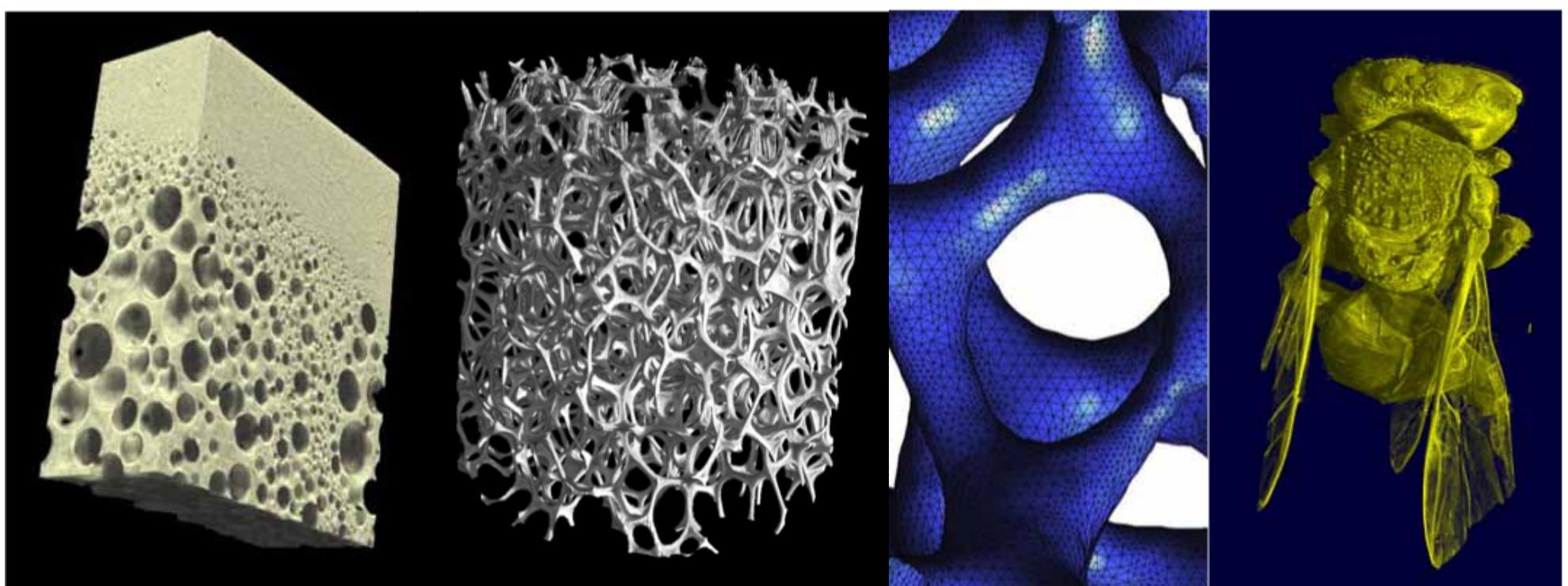
Advanced hard X-ray imaging techniques applied to bio-medical and materials science studies

Lucia Mancini



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Imaging techniques play an important role in several research fields: medicine, biology, material science, geosciences and archaeology. Optical and scanning electron microscopy techniques are widely adopted tools for the investigation of the texture and morphology in a large range of materials. Imaging techniques based on hard X-ray are also of particular interest and microradiography has proved to be useful for clinical diagnostics and for the investigation of crystal growth.

In recent years great interest has been posed on X-ray computed microtomography (micro-CT) techniques, both employing microfocus and synchrotron radiation sources. These techniques produce three-dimensional (3D) images of the internal structure of objects with a spatial resolution at the micron- and submicron- scale. Investigations performed directly in the 3D domain overcome the limitations of stereological methods usually applied to microscopy-based analyses and a non-destructive approach is more suitable for further complementary analyses and for precious or unique samples (fossils and archeological finds, in-vivo imaging, etc ...).

An intriguing challenge is to extract from 3D images quantitative parameters directly related to the physical properties of the studied materials and biomaterials. However, accurate image processing and analysis methods for an effective assessment of these parameters are still an open issue.

Several scientific applications of advanced hard X-ray imaging techniques will be presented in this seminar.

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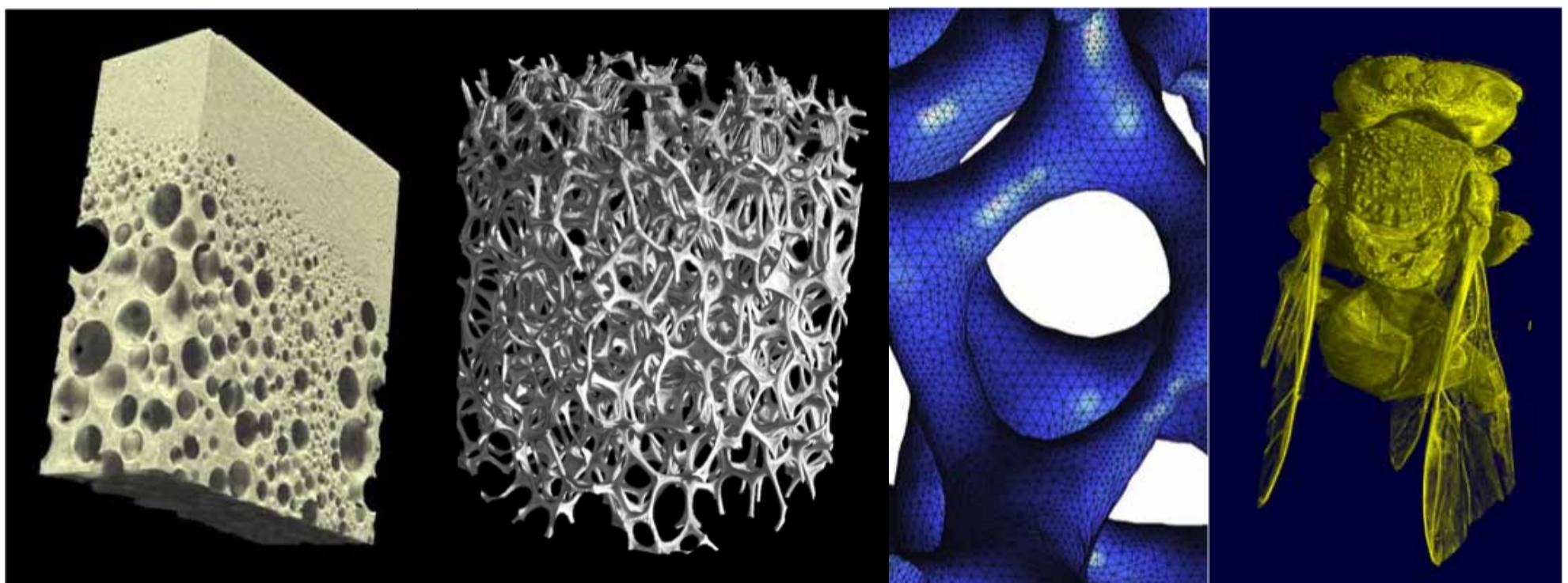
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Lucia Mancini is a material science physicist. She worked from 1992 to 1994 in an Italian industrial research center. She has been PhD and Post-doc at the ESRF synchrotron facility (Grenoble, France) from 1995 to 1999, researcher at the CRMCN of CNRS (Marseille, France) in 1998 and at the IMM of CNR (Bologna, Italy) from 1999 to 2001. She is senior scientist at the SYRMEP (SYnchrotron Radiation for MEdical Physics) beamline of Elettra since 2001. Since 2005 she is also the scientific responsible of the TomoLab instrument at Elettra devoted to conventional microfocus X-ray microtomography. Lucia Mancini's main expertise is in the field of material science using X-ray diffraction and imaging techniques and her main interest is the application of these techniques to innovative materials and geosciences. She is co-author of more than 100 scientific papers that have appeared in peer-reviewed journals, co-supervisor of several MSc and PhD theses and presented her scientific results to more than 150 international workshops and conferences.

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