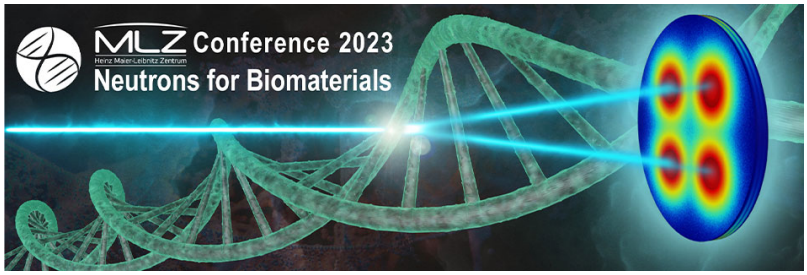

Contribution ID: **45** Type: **Talk**

Interaction of nanoparticles with lipid films: the role of symmetry and shape anisotropy

Tuesday 23 May 2023 14:30 (20 minutes)

Nanoparticles are nowadays widely used in biology and have quickly emerged as essential to modern medicine. When nanomaterials come into contact with biological membrane, their interaction with biomacromolacules and biological barriers will determine their bioactivity, biological fate and cytotoxicity. It goes without saying that understanding the interaction between nanomaterial and biological interfaces is vital to bridge the gap between design/synthesis/engineering of nanoparticles and their full translation into end-use applications. In this context, the role of symmetry/shape anisotropy of both the nanomaterials and biological interfaces in their mutual interaction, is a relatively unaddressed issue.
Here we present the findings about the interaction of gold nanoparticles (NPs) of different shape, i.e. nanospheres and nanorods, with biomimetic membranes of different symmetry, i.e. lamellar (of 2D symmetry), and cubic (of 3D symmetry) membranes.
Through the combination of structural scattering techniques (in particular Neutron Reflectometry), we observed that, on a nanometric lengthscale, the structural stability of the membrane towards NPs is dependent on the topological characteristic of the lipid assembly and of the NPs, with higher symmetry related to higher stability. Moreover, Confocal Microscopy analyses highlight, on a micrometric lengthscale, that cubic and lamellar phases interact with NPs according to two distinct mechanisms, related to the different structures of lipid assemblies.
This study represents a first attempt to systematically study the role of membrane symmetry on the interaction with NPs; the results will contribute to improve the fundamental knowledge on nano-bio interfaces and, more in general, will provide new insights on the biological function of lipid polymorphism in interfacial membranes as a response strategy.

Author: MANGIAPIA, Gaetano (German Engineering Materials Science Centre (GEMS) am Heinz Maier-Leibnitz Zentrum (MLZ))

Co-authors: Prof. RIDOLFI, Andrea (Uni Florence); Prof. MONTIS, Costanza (Uni Florence); Prof. BERTI, Debora (Uni Florence); Prof. GUSTAFSSON, Emil (Uni Uppsala); Dr MOULIN, Jean-Francois (Hereon); Prof. CASELLI, Lucrezia (Uni Florence); Prof. STEINKE, Nina-Juliane (ILL); Prof. MALTONI, Pierfrancesco (Uni Florence); NYLANDER, Tommy (Lund University)

Presenter: MANGIAPIA, Gaetano (German Engineering Materials Science Centre (GEMS) am Heinz Maier-Leibnitz Zentrum (MLZ))

Session Classification: Lipids and membranes

Track Classification: Lipids and membranes