

Conferencista

Plenaria

Rectorado UNS - Aula Magna

Miércoles 20 de 10.00 a 11.00

Physical chemistry of polyelectrolyte assemblies: from polyelectrolyte nanoparticles to small molecule - polyelectrolytes complexes

Sergio Moya

Centro de Investigación Cooperativa en Biomateriales CIC biomaGUNE, San Sebastián

Polyelectrolytes are polymers bearing multiple charges. Polyelectrolytes respond to changes in ionic strength and pH varying conformation. They are easy to synthesize, assemble, and pattern, being excellent tools for nanofabrication. A large number of biomolecules that can be considered polyelectrolytes play important roles in biology, like proteins and many glycans.

Polyelectrolytes can associate with other polyelectrolyte molecules by attractive electrostatic interactions and for complexes, i.e. associations of molecules hold together by non covalent interactions. Polyelectrolytes can also complex small charged molecules. Complexation involving polyelectrolytes is a frequent phenomena in nature, and it is also has practical relevance as a mean for the encapsulation of charged drugs and therapeutics in drug carriers.

The design of polyelectrolyte based carriers for drug delivery is one the main research lines in our group. Besides therapeutic applications we are interested in the biological fate of the carriers, and in understanding physico chemical aspects of the complexation of small and large molecules with polyelectrolytes. The focus of this presentation will be to discuss fundamental issues related to the formation and complexes between polyelectrolyte carriers and charged therapeutics: nucleic acids, doxorubicin (chemotherapeutic agent), anthocyanins (antioxidants), among others, and their physico chemical characterization. For this a battery of experimental techniques will be applied: Time Lapsed NMR, diffusion NMR, Fluorescence Correlation Spectroscopy, Confocal Microscopy, TEM, Small Angle X Ray Scattering, Circular Dichroism, etc.

In the presentation it will be analysed how the electrostatic association among oppositely charged molecules can impose their spatial organization and lead to the formation of more complex supramolecular structures with new physico chemical characteristics. Colloidal properties of the complexes and their responsiveness to changes in the environment will be as well described. Finally, the physical chemistry of the complexes will be related to their therapeutic goals highlighting the relevance of the physical characterization for understanding biological fate and for the properly design of drug delivery systems.