

PROGRAMA DE PÓS-GRADUAÇÃO EM QUÍMICA SEMINÁRIOS

2021/1 - PPGQ / SEM I e II

DATA:

10/03/21

PALESTRANTE:

Prof. Dr. Artur J. M. Valente

INSTITUIÇÃO:

UC – Universidade de Coimbra, Portugal (Departamento de Química)

TÍTULO DA PALESTRA:

Polyelectrolytes – Properties and Applications.

RESUMO:

Polyelectrolytes are macromolecules that, when dissolved in a polar solvent like water, have a (large) number of charged groups covalently linked to them. The combination of polymeric and electrolyte behaviour gives them a number of useful properties allowing their application in different fields. Such properties also raise important issues, some of them highly challenging from the physical-chemistry point of view as, for example, those related with the screening effect.

In this seminar, we will focus on the behaviour and features of polyelectrolytes used in different applications including optoelectronics, drug delivery, water remediation and sensing.

Conjugated polyelectrolytes (CPEs) have emerged as advanced materials, which combine the electronic, spectroscopic, and photophysical properties of conjugated organic polymers with the solubility in water and polar solvents of ionic compounds. However, frequently CPEs are not present as isolated polymer chains, and they tend to aggregate in water. Taking as example polyfluorene-based rigid rod polyelectrolytes, we will discuss different approaches to break up such aggregates and thus to improve luminescence and electrical conductivity properties of polyelectrolytes.

Concerning the drug delivery systems, we will describe the synthesis and properties of physical and chemical crosslinked DNA gels; the application of DNA gels as drug vectors for cancer therapy will be discussed.

Recently, we have been interested in the use of natural and modified biopolyelectrolytes (e.g., chitosan and pectin) for the formation of coacervate gels for sorption of aromatic compounds naturally present in crude oil. Hydrogel composites containing β -cyclodextrin functionalized pectin show quite good removal efficiency values for most of the tested adsorbates, as a consequence of the occurrence of a multilayer sorption.

The last topic to discuss concerns the use of, e.g., poly(sodium acrylate) as a matrix for the development of lanthanide-based complexes with sensing properties.