Mixed Ionic-Electronic Composites based on Poly(3,4-ethylenedioxythiophene) and Organic Ionic Plastic Crystals

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Mixed ionic and electronic conduction plays a key role in energy storage systems (ESS) such as fuel cells, batteries and supercapacitors [1]. The operating mechanism of these devices involves the concomitant processes of ion conduction along with the electron transfer, which determines the efficiency of the device. Mixed ionic-electronic conductors (MIECs) are potentially ideal additives for electrodes to provide that electron conduction together with the ionic conductivity, which makes possible the transport of the ions through the electrode.

In this presentation, we will present mixed ionic-electronic conducting materials based on the conducting polymer poly(3,4-ethylenedioxythiophene) (PEDOT) and Organic Ionic Plastic Crystals. Nowadays, PEDOT is the most used conducting polymer due to its high electronic conductivity, stability and easy processing. On the other hand, OIPCs consist of an organic cation and anion pairs that have regular crystal structures in the solid state. One or both ions in the crystal can exhibit translational motions, which allow the material to flow under stress. These motions provide OIPCs of multiple solid-solid phase transitions and plastic mechanical properties, which are highly desirable in electrochemical devices to improve the poor contact between the electrode and electrolyte and facilitate ion diffusion [2].

In this talk, we will present the development of MIEC composites, together with their structural, and electrochemical characterization, as well as their application in energy storage systems. It will also be shown the synergy created in the composites to improve the intrinsic properties of the individual components [3,4].

References

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Figures

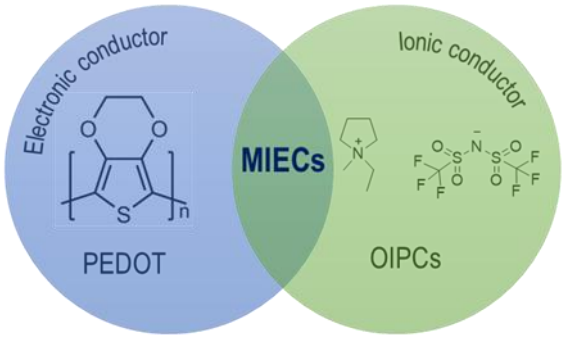

Figure 1: Representation of Mixed Ionic Electronic Conducting (MIEC) composite materials