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Sala de Grados, Ed. A Facultad de Ciencias, Campus San Francisco

INMA Junior

Novel di-block *bent-core* amphiphiles: an approach to energy devices

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Metal-ion transport materials have been a focus of intense research for the development of batteries for portable energy storage devices in daily life. Ion-conductive liquid crystal (LC) structures and gels have drawn much attention as quasi-solid and solid-state electrolytes, providing macroscopic alignments of phase-segregated ordered structures. Recent advances have led to the development of a novel generation of ionic-conductive LC materials using amphiphilic *bent-core* molecules. Owing to their polar and compact nanosegregated packing, *bent-core* amphiphiles combined with Li^+ may exhibit 2D nanochannels with easy processing and proper mechanical properties. In this seminar, the design, supramolecular self-assembly, and structural characterization of new diblock molecules consisting of an ion-conductive tetra(ethylene oxide)-based unit uncoupled from the *bent-core* structure are proposed for the formation of 2D pathways for lithium and sodium ion transport in the LC state or in solvents. Material characterization revealed that lithium and sodium-based complexes stabilized thermotropic LC phases, in contrast to the non-LC pure compounds. Furthermore, both the pure amphiphiles and doped materials were able to self-assemble into physical gels in a non-polar solvent, exhibiting three-dimensional networks of nanotubes and helical nanostructures. The dual and dynamic nature of these materials, which respond to both low- and high-frequency electrical fields as well as their ability to form ferroelectric crystals and gels with energy storage capacity, will be harnessed to develop novel energy devices.

Novel strategies in the fabrication of molecular electronic devices

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The main premise in the field of molecular electronics is that molecules, tailored with the adequate molecular structure, can perform in the same manner as typical electronic components such as wires, switches, transistors, or rectifiers. This potential has firmly established molecular electronics as one of the main alternatives to complementary metal-oxide semiconductor technology (CMOS), which in the last decade has been striving to push the miniaturization limits in the fabrication of electronic devices. Large-area molecular devices, where molecules are assembled in closely packed monolayers onto solid supports, stand out as the most promising approach for the incorporation of molecular electronic devices to the market, as they address the main issues related to single molecule junctions. Additionally, novel strategies such as host-guest chemistry and molecular scaffolding have been developed to go a step forward and fabricate large-area devices comprised of well-ordered and robust unimolecular junctions, where lateral interactions between neighboring molecules are prevented. This results ensure the possibilities of molecular electronics as a viable alternative for CMOS technology and allows to study further functionalities of these systems such as their applications in spintronics or as thermoelectric devices.