Tentative Outline

Special Issue for Current Organic Chemistry

Guest Editor(s): César Saldias

TITLE: Nanostructured "all-polymers" devices as dielectric materials

Aims & Scope:

Materials having high dielectric constant, high energy density and minimum dielectric loss are highly desirable to be used in capacitor devices. In this sense, polymers and polymer blends have some advantages over inorganic materials such as flexibility, higher breakdown strength, and lower dielectric loss. Moreover, dielectric performance of polymers depends strongly on electronic, dipolar, ionic and interfacial polarizations. For these reasons, the chemical modification and the introduction of specific functional groups (e.g., F, CN, -SO2R, etc) would allow to improve the dielectric properties e.g., by varying the dipolar polarization. These functional groups have demonstrated to have a large dipole moment. In this way, a high orientational polarization of the polymer could be achieved. However, the diminishing of dielectric dissipation and frequency dependency are still challenging tasks. In order to address these issues, varied conductive structures as fillers, such as, poly(thiophene), poly(aniline), among others, have been used with relative success. The above, aimed to obtain high dielectric constant and low dielectric loss. Additionally, some strategies employ covalent–linkage between the conductive and insulating polymers benefiting to the improvement of the compatibility giving raise to low dielectric loss. This allows to generate a multiple polarization and designing of a particular nanostructures helping promote the dielectric properties of polymeric material. Therefore, the control of polymer backbone structure and functionality has a remarkable and profound effect on the side chain. For example, the design of vinyl polymers with oligomer thiophenes as polar groups at the side chain resulted in change the aggregation of oligothiophene their mechanical properties and, consequently, their dielectric properties. Moreover, conjugated thiophene chains exhibit high degree of polarization due to existence of sulfur atom situating them as good candidates for dielectric materials. Recently, polymers containing nanostructured tiophene domains have exhibited high permittivity and relatively low dielectric loss. However, some of these polymers present deficient mechanic properties and considerable energy loss mainly attributed to the presence of defects associated with low molecular weight of polymers.

Subtopics:

- Nanostructured "all-polymers" devices as dielectric materials
- Self-assembled polymers as integrated systems for artificial photosynthesis
- Photoresponsive molecularly imprinted hydrogels for recognition of biological molecules of interest

Approximate Schedule:

Manuscript Submission Deadline: 03/31/2017