Multifunctional and Sustainable hybrid and nanocomposite materials for electronics, sensors and energy

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Commercially available electronics materials with sensors and energy applications offer excellent performance at affordable prices. However, these materials primarily consist of long-lasting, petroleum-derived components. Furthermore, their development has been within the framework of a linear economy (produce-use-waste), neglecting considerations of biodegradability, circularity, and end-of-life management. The sustainability of these materials is compromised by issues such as scarcity, human and environmental toxicity, and challenges in recycling. Therefore, it is crucial to prioritize developing materials for electronics that are biobased, biodegradable, and environmentally friendly.

In this talk, we will summarize the available sustainable alternatives to traditionally employed materials for electronics. We will briefly survey the employment of biopolymer composites as biodegradable, flexible, and lightweight insulators.[1,2] The seminar's core will be nanocomposites engineered as dielectric and electrical conductors to fit multiple applications ranging from sensors to energy. We will summarize the use of green approaches to fabricate electronic materials that can degrade partially or fully in the environment. We will discuss strategies to make degradable electronic conductors.[3] Finally, possible applications that will thrive by exploiting environmentally friendly nanocomposites for sensors and energy, e.g., in the context of edible electronics or robotics, will be considered.[4]

References:

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