



In situ assembly of bacterial cellulose/graphene oxide spherical hydrogels for their application as nanocarriers

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Abstract:

Nowadays, biomedical research and technology is focused on the development of new materials with specific properties. One of the most important aspects in the development of new forms of medication is focused on the design and application of controlled drug dosing systems and localized management systems for the activity of a particular drug. The current trend in such applications is the use of natural polymers such as chitosan, alginate or cellulose. Bacterial cellulose (BC) is a biopolymer synthesized by some bacterial strains which displays unique properties i.e. high crystallinity and purity degree, excellent mechanical performance, porosity and high swelling capacity attributed to the 3D nanofibrillar network structure formed during the biosynthesis process. Due to this last feature, BC can be considered a hydrogel. Depending on the cultivation technique used, BC can be obtained in different morphologies with variable properties. In dynamic cultures spherical particles can be obtained. BC obtained in dynamic cultivation presents a more disordered structure, higher porosity and higher water holding capacity. Moreover, to enhance and extend its applications in biomedicine and pharmacology, BC is normally modified to tailor its properties. Hydrogels presented different swelling capacity, and semiconductive behavior, which could open new possibilities for the development of electro-stimulated systems. Additionally, in order to evaluate the possible application of these hydrogels as nanocarriers for controlled drug release, the loading and release in simulated intestinal fluid of ibuprofen has been carried out.

Biography:

Leire Urbina obtained her Bachelor's Degree in Chemical Engineering at the University of the Basque Country (UPV/EHU). Afterwards, she studied a Master in Renewable Materials Engineering at the Engineering College of Gipuzkoa (UPV/EHU).



She was granted with a 4 year pre-doctoral fellowship from the Basque Government and developed her research in the "Materials+Technologies" Research Group. She had the final evaluation of the International Thesis work entitled "Biosynthesis and characterization of polymers from cider by-products."

Recent Publications:

1. Leire Urbina et al; Bacterial-cellulose-derived carbonaceous electrode materials for water desalination via capacitive method: The crucial role of defect sites, 2020.
2. Leire Urbina et al; Tailoring the in situ conformation of bacterial cellulose-graphene oxide spherical nanocarriers, 2020.
3. Leire Urbina et al; Cocoa shell: an industrial by-product for the preparation of suspensions of holocellulose nanofibers and fat, 2020.
4. Leire Urbina et al; Valorization of apple waste for active packaging: multicomponent polyhydroxyalkanoate coated nanopapers with improved hydrophobicity and antioxidant capacity, 2019.

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