Stimuli responsive Bacterial Cellulose composites

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Raw materials of natural origin and in particular, biopolymers like cellulose play an essential role as eco-friendly materials. Cellulose (C) and nanocellulose (NC)-based materials have emerged as exciting candidates to industries, governments and consumers as green, sustainable and natural materials for the fabrication of advanced complex composites.

Nanoparticles (NPs) can be tuned chemically and structurally to obtain NPs with interesting properties. Combining materials of raw origin, like cellulose, with nanoparticles opens new avenues in developing novel materials that harness nanotechnology and nature.

In this context, we will present our latest development on novel stimuli-responsive materials for various applications based on bacterial cellulose (BC). We explored the modification of BC at the biosynthesis steps during the bacterial cellulose production or ex-situ after the synthesis. We created multifunctional bacterial cellulose laminate materials and spherical BC structures with the confinement of several types of nanoparticles. The possibility to control the content of materials and the structure of the BC expands the palette of interesting biohybrids.

Figures

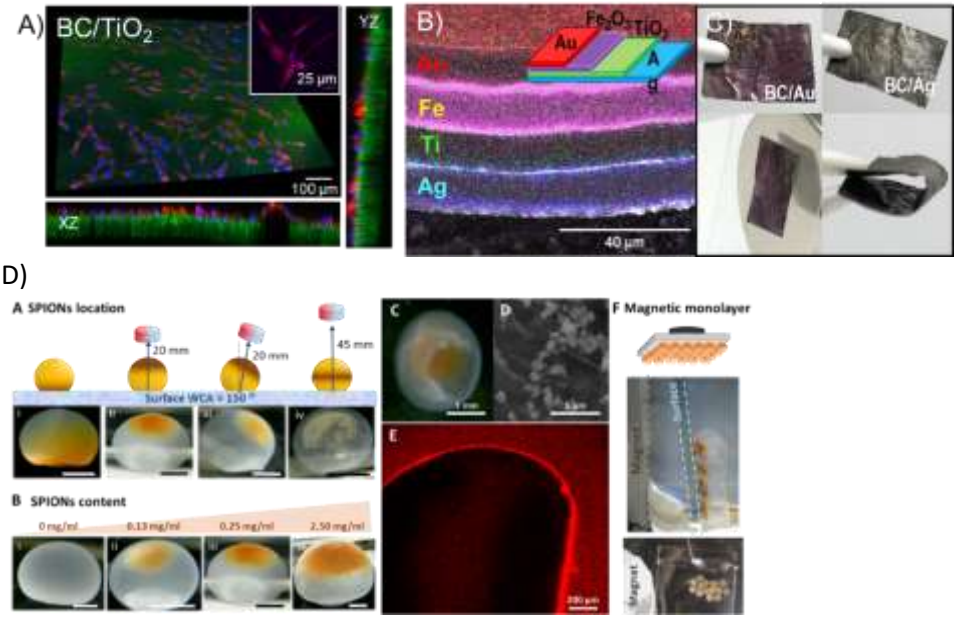

Figure 2: BC Composites of: A) Titania nanoparticles where we cultured fibroblast cells, B) Multilaminate BC composites C) Flexible BC nanocomposites. D) BC spheres composite with SPIONs to afford magnetic responsible biomaterials.