Exploiting Nanotechnology and Nature to build novel materials

Anna Laromaine
Group of Nanoparticles and Nanocomposites; ICMAB-CSIC, Campus UAB, Bellaterra.
www.icmab.es/nn

The need to provide eco-friendly materials to reduce costs and risks associated to waste echoes in many fields as the European Commission strengthens the substitution of plastics and petroleum-based materials. In this context, raw materials of natural origin and in particular natural biopolymers like cellulose play an important role. Cellulose (C) and nanocellulose (NC)-based materials have emerged as interesting candidates to industries, governments and consumers as green, sustainable and natural materials for the fabrication of advanced complex composites.

Additionally nanoparticles (NPs) offer the possibility to chemically and structurally tune their properties influencing how they interact with different materials. Hundreds of NPs have been proposed in a diverse fields, however the lack of a time- and batch-efficient method to evaluate NPs and processes prevents establishing general fundamental principles and impedes their progress, in specific as future drugs and therapies unless high throughput methods advance.

The possibility to combine materials of raw origin, like cellulose, with nanoparticles open new avenues in the development of novel materials, which harness nanotechnology and nature.

In this context, we will present our latest development on novel stimuli responsive materials for a variety of applications. In addition, we will show how we can evaluate those biomaterials on the *in vivo Caenorhabditis elegans,* which emerges as a test-bed for the multiparametric optimization of those nanomaterials.

BIO

Anna Laromaine is a chemist from the University of Girona (UdG), PhD in Chemistry from the Materials Science Institute of Barcelona (ICMAB) and the Autonomous University of Barcelona (UAB) with extensive international scientific experience. Her PhD focused on the molecular synthesis of carboranes for catalysis and medical therapy. As postdoctoral researcher at Imperial College London (UK) in the group of Prof. Molly M. Stevens, she developed a colorimetric sensor for the detection of proteases based on gold nanoparticles and peptides. She studied the replication of surfaces with DNA and peptides using supramolecular interactions at MIT (USA) in the group of Prof. Francesco Stellacci. They developed new methodologies for the production of cell cultures in three-dimensional structures on paper and the combination of the use of C*. elegans* and microfluidic chips for innovative biological assays at Harvard University (USA) in the group of Prof. George Whitesides.
She is currently Investigadora Distinguida at the ICMAB where she combines materials science, chemistry and biology for biological applications. She focuses on the use of cellulose materials and nanoparticles to create multifunctional composites and responsive material. The interaction of those novel materials is evaluated in cells within 2D and 3D cell cultures and using the animal *C. elegans*. They optimize the physico-chemical properties of the novel multifunctional materials using biocompatible approaches that are economical and have low environmental impact.
She actively participates and has experience in scientific divulgation activities and technology transfer.