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Layer-by-Layer free-standing membranes made of natural polymers for drug delivery

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The performance of polymeric structures as drug delivery systems and implantable devices is fully dependent on their stability and integrity in biological environments. The Layer-by-Layer (LbL) technology is a versatile technique that can be used to fabricate numerous structures such as planar ultrathin films and membranes, without using aggressive solvents. LbL relies on the use of polyelectrolytes with an opposite charge assembled onto very thin (few nm) or large (several tens of µm) structures. The nature of polymer interactions makes the assembly a versatile platform to load and release macromolecules. The deposition of hundred layers of biopolymers (polysaccharides) on a low energy substrate (polypropylene) led to the production of a thick free-standing membrane with tunable thickness (tens of µm) and mechanical properties. For example, these membranes were able to drive bone generation in vivo after loading with the osteogenic factor BMP-2. LbL free-standing membranes could be produced with various biopolymers (hyaluronic acid, collagen…) and deliver biomacromolecules such as proteins or nucleic acids or even nanoobjects for skin or mucosal applications.

Biography

Claire Monge obtained her PhD from the Grenoble Alpes University (France) in Physiology and Pharmacology and has integrated the French National Center of Research (CNRS) in 2017 as a permanent researcher in the Laboratory of Tissue Biology and Therapeutical Engineering (LBTI). Her scientific interests are natural drug delivery systems. She develops a research topic around the LbL technology applied to protein and nanoparticule delivery at mucosal sites: (http://lbti.ibcp.fr/?page_id=2014).

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