

JOINT EVENT

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**The fabrication of self-shrinking multilayer bio-capsules templated on CaCO<sub>3</sub> vaterite crystals**J Campbell<sup>1</sup>, R Ali<sup>1</sup>, V Vigneswaran<sup>1</sup>, D Volodkin<sup>1</sup> and A Vikulina<sup>1,2</sup><sup>1</sup>Nottingham Trent University, UK<sup>2</sup>Fraunhofer Institute for Cell Therapy and Immunology, Germany

Biopolymer based multilayer capsules are novel vectors for advanced drug delivery. Capsules assembled using decomposable and mesoporous CaCO<sub>3</sub> vaterite crystals can host enormous amounts of biomolecules (such as proteins and peptides, small drugs, nucleic acids, etc1) and release them in a controlled manner. Protection and controlled release of biomolecules are the main advantages of the capsules; this can be achieved by adjusting the capsule structure by varying the number of layers, polymer nature and distribution into capsules. Loading of biomolecules into capsules at physiologically relevant and mild conditions is indispensable for bio-applications. This work aims to fabricate capsules from a variety of biopolymers and assess their stability and the encapsulation performance. The following biopolymers have been tested for polyanions (chondroitin sulfate, hyaluronic acid, dextran sulfate, and heparin) and polycations (poly-L-lysine, dextran amine, collagen, and protamine). The most attractive pairs of biopolymers, in-terms of capsule integrity are identified and retention of biomolecules within the capsules is considered. Shrinkage of capsules at room temperature during CaCO<sub>3</sub> removal is used for capture of biomolecules into capsules and is discussed by taking into account the charge compensation in cooperative interpolymer complexation. Interestingly, occupation of the vaterite crystal pores with polymer during capsule fabrication is also responsible for the observed capsule shrinkage and fusion phenomena.

**Biography**

A Vikulina has completed her PhD in the field of Biological Science in Lomonosov Moscow State University, Russia. Currently, she is Marie-Curie Fellow in Fraunhofer Institute for Cell Therapy and Immunology, Potsdam, Germany. Her research is focused on the development of drug delivery carriers for controlled drug delivery and testing as well as for deciphering the pathways of biological action and transport of drugs. She has been awarded by prestigious Alexander Von Humboldt and Marie-Curie Fellowships, served as a member of organizing committees at international conferences and scientific olympiads. She is also a Guest Editor in Micromachines Journal.

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