

**Sustained release of prednisone and mesalamine from diatom exoskeletons:
bioinspiration for the development of safe oral drug delivery devices to tackle
gastrointestinal diseases**

Hongbo Zhang¹, Mohammad-Ali Shahbazi¹, Ermei Mäkälä^{1,2}, Tiago H. Silva^{3,4}, Rui L. Reis^{3,4}, Jarno Salonen², Jouni Hirvonen¹, Hélder A. Santos¹

¹ Division of Pharmaceutical Technology, Faculty of Pharmacy, University of Helsinki, FI-00014 Helsinki, Finland

² Laboratory of Industrial Physics, Department of Physics and Astronomy, University of Turku, FI-20014 Turku, Finland

³ 3B's Research Group - Biomaterials, Biodegradables and Biomimetics, University of Minho, Headquarters of the European Institute of Excellence on Tissue Engineering and Regenerative Medicine, AvePark, 4806-909 Taipas, Guimarães, Portugal

⁴ ICVS/3B's – PT Government Associate Laboratory, Braga/Guimarães, Portugal

Mesoporous silicon and silica-based particles have recently been synthesized and proposed for the controlled delivery of several drugs [1,2]. On the other hand, nature and in particular marine organisms have been the source and inspiration for the development of different biomedical applications, including drug delivery devices [3]. On the border of both rests diatoms exoskeletons, nature-made porous silica-based microparticles with amazing morphological features, promising a high potential in drug delivery. Nevertheless, its safety and drug permeability on oral formulations have not yet been studied. In this study, we have demonstrated that diatoms silica microparticles (DSM) have almost no toxicity in colon cancer cells Caco-2, HT-29, HCT-116 and Caco-2/HT-29, even at concentrations as high as 1000 µg/mL. Moreover, the delivery profile of two common drugs to address gastrointestinal diseases, mesalamine (anti-inflammatory) and prednisone (glucocorticosteroid). DSMs are able to release prednisone in a controlled manner and change its absorption pattern, which may improve the safety of its administration. In addition, DSMs can enhance the permeation of mesalamine. These results confirm the potential of DSMs for the development of oral formulations for the therapy of gastrointestinal diseases.

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