



## Fluorine-free super hydrophobic coating with antibiofilm properties based on Pickering emulsion templating

Mor Maayan, Karthik Ananth Mani and Guy Mechrez

*The Hebrew University of Jerusalem, Israel*

### Abstract

This study presents antibiofilm coating formulations based on Pickering emulsion templating. The coating contains no bioactive material because its antibiofilm properties stem from passive mechanisms that derive solely from the super hydrophobic nature of the coating. Moreover, unlike most of the super hydrophobic formulations, our system is fluorine-free, thus making the method eminently suitable for food and medical applications. The coating formulation is based on water in toluene or xylene emulsions that are stabilized using commercial hydrophobic silica, with polydimethylsiloxane (PDMS) dissolved in toluene or xylene. The structure of the emulsions and their stability was characterized by confocal microscopy and cryogenic-scanning electron microscopy (cryo-SEM). The most stable emulsions are applied on polypropylene (PP) surfaces and dried in an oven to form PDMS/silica coatings in a process called emulsion templating. The structure of the resulting coatings was investigated by atomic force microscopy (AFM) and SEM. The surface of the coatings shows a honeycomb-like structure that exhibits a combination of micron-scale and nanoscale roughness, which endows it with its super hydrophobic properties. After tuning, the super hydrophobic properties of the coatings demonstrated highly efficient passive antibiofilm activity. In vitro antibiofilm trials with *E. coli* indicate that the coatings reduced the biofilm accumulation by 83% in the xylene–water-based surfaces and by 59% in the case of toluene–water-based surfaces.

### Biography

Mor Maayan is doing her M.Sc. in the Agricultural Research Organization, Volcani Center, and the faculty of agriculture of the Hebrew university, Israel. Her research is centered on polymer and Pickering emulsions, focusing on ecofriendly super hydrophobic materials and properties. Previously she worked in the food industry in various positions of quality control and external R&D projects. [mor.maayan@mail.huji.ac.il](mailto:mor.maayan@mail.huji.ac.il)



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