

3<sup>rd</sup> International Conference on

# FOOD CHEMISTRY & NUTRITION

May 16-18, 2018 | Montreal, Canada

## Synthesis of new inorganic Janus particles: Self-assembly, nanostructuring and applications

Guy Mechrez, Yafit Itzhaik Alkotzer, Franziska Grzegorzewski, Karthik Ananth Mani and Noga Yaakov

Agricultural Research Organization, Volcani Center, Israel

Janus particles (JPs) have two or more distinct surfaces with different physical properties, allowing different types of chemistry to occur on the same particle. Due to their ability to self-assemble at the interface between two immiscible fluids, JPs have great potential as a new class of colloidal materials with advanced functionalities. These JPs are usually fabricated by immobilizing isotropic particles on a given surface and regioselectivity modifying their exposed hemispheres. However, this approach is complex in various aspects, and therefore of lower interest for potential industrial applications. Spontaneous, template-directed strategies or self-assembly of the particles are thus highly preferred. This research presents *in-situ* functionalization of silica nanoparticles in oil-in-water (o/w) biphasic system with two equimolar organosilane of antagonistic polarity to generate JPs with a desired distribution of hydrophilic and hydrophobic surface regions (amphiphilic particles). Homogeneous and stable pickering emulsions have been obtained, where droplet size can be tuned according to the silica particle concentration and the o/w ratio used. The micro- and nano-structure was analyzed by optical and fluorescence microscopy and cryo-SEM. Such formulations enabled the successful individual encapsulation of fungal spores of *Metarhizium anisopliae*, which is implemented in efficient formulations for bio pesticides in agricultural applications. In addition, we present new, rapid and facile approach for the synthesis of JPs via polymer precipitation process, resulting in core-shell structure that allows selective chemical modification of the exposed hemispheres of the particles. This opens up novel and emerging applications of JPs, such as chemical sensors, super hydrophobic surfaces and encapsulation techniques.

guyme@volcani.agri.gov.il