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|  |  |  הטכניון - מכון טכנולוגי לישראל TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY  |
| הפקולטה להנדסה כימיתע"ש וולפסון |  |  |
| The Wolfson Department of Chemical Engineering |  |  |

**Wolfson Department of Chemical Engineering Seminar**

**Wednesday, April 28th, 2021 at 13:30**

**Online seminar via Zoom**

<https://technion.zoom.us/j/97591164072>

**Pickering Emulsions for Food and Agriculture**

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Pickering emulsions are emulsions of any type, for example oil-in-water (o/w) or water-in-oil (w/o), stabilized by solid particles instead of surfactants. In comparison to surfactant-based emulsions, Pickering emulsions show improved stability, low toxicity, adjustable permeability, and diverse functionality according to a variety of particles available, thus making the emulsions suitable for many applications in biomedical and food sciences.

In this research, we have developed Pickering emulsions that are stabilized by functionalized silica nanoparticles, and have implemented them toward challenges in the field of food and agriculture. We present a highly tunable and biocompatible biopesticide formulation, based on a single cell microencapsulation of the conidia enthomopathogenic fungus Metarhizium brunneum in an o/w silica-stabilized Pickering emulsion. The Pickering emulsion-based formulation exhibited significantly higher pest control activity against Spodoptera littoralis larvae compared to the control systems, thus making it a promising, cost effective, innovative approach to tackling the arthropod pest control challenge in agriculture.

Another approach to prepare stable, homogeneous oil-in-water (o/w) Pickering emulsions is by in situ functionalization of silica nanoparticles by two organosilanes with opposite polarities, leading to the formation of silica-based colloidosomes. The introduction of carbon nanotubes (CNT) to the silica based Pickering emulsion enabled us to prepare electrically conductive CNT/silica colloidosomes with controlled porosity and electrical conductivity. CNTs and silica nanoparticles both are located in the interface, as evidenced by confocal laser scanning microscopy and cryo-SEM.

In addition, we have developed a new superhydrophobic coatings based on a silica-stabilized oil-in-oil Pickering emulsion system. The application of the emulsions on a given surface, along with a rapid drying process results in the formation of unique silica-based shells-like structures which demonstrates a combination of micro- and nanoscale roughness, resulting in a durable and transparent superhydrophobic surfaces. The coating compositions can be tuned to meet the demands and the requirements of the food industry in terms of costs and regulation.