Abstract No: 551 (Poster) *Natural Sciences*

Pickering emulsions stabilized by a non-ionic surfactant and assorted metal oxide nanoparticles

M.M.N.A. Siddika, D.N. Karunaratne* and E.P.N. Premarathne

Department of Chemistry, Faculty of Science, University of Peradeniya, Sri Lanka
**nedrak@pdn.ac.lk*

Pickering emulsion is an emulsion stabilized by solid particles in place of surfactants as the emulsifier. Stabilization of emulsion droplets takes place by means of adsorption of solid particles at the surface of the emulsion droplets. Solid particles are not amphiphilic like surfactants. Thus the stabilization mechanism is very different from surfactants. Partial wetting of the surface of the solid particles by water and oil is the origin of the strong anchoring of solid particles at the oil-water interface. There are numerous potential applications of Pickering emulsions. These are used in cosmetic industry, food applications and in pharmaceutical industry for drug delivery purposes.

A ternary phase diagram was used to select formulations of unstable emulsions. The three components in the phase diagram are Olive oil, water and the surfactant- Span 80. It has been shown in a previous study that Magnesium Oxide (MgO) nanoparticles successfully stabilized micro emulsions. In our study Zinc Oxide (ZnO) nanoparticles were synthesized using a Sol-gel process. Commercially available Titanium dioxide (TiO_2) nanoparticles were taken for this purpose. Using the ZnO and TiO_2 nanoparticles, the morphologies of the resulted Pickering emulsions were studied and compared with the emulsions formed with MgO.

The key main conclusions of this work are that different metal oxide nanoparticles can be used as stabilizers of Pickering emulsions. MgO nanoparticle has the ability to convert an unstable emulsion into a stable micro emulsion, whereas ZnO and TiO_2 have the ability to form macro emulsions. The increasing order of particle size of metal oxide nanoparticles are 25, 70 and 100 nm for TiO_2, MgO and ZnO respectively. Particle size is one factor that determines the stability of emulsions. Moreover the chemical interactions between the solid surface and the two liquid phases, which ultimately determine the contact angle mainly affect the stability of emulsions.