

Supporting information

A Practical pH-Responsive Pickering Emulsion

Jian Li and Harald D.H. Stöver

Department of Chemistry, McMaster University, Hamilton, ON, Canada L8S 4M1

Emulsion characterization

The type of emulsion was evaluated by both conductance measurements and drop tests. The conductance was obtained using the conductance function in the ZetaPlus zeta potential analyzer. The emulsion made at pH4.5 was tested directly and conductance was $1.628 \times 10^3 \mu\text{S}$ under the applied voltage of 7.54, which shows that aqueous phase is the continuous phase and a xylene-in-water emulsion is formed. Supporting evidence came from a “drop test”. A drop of emulsion was added into 10mL water and a white dispersion was formed immediately, indicating that water is the continuous phase in the emulsion.

Particle size distribution was determined using Malvern Mastersizer 2000 coupled with a Hydro 2000G large volume wet sample dispersion unit. The refractive index of the emulsion droplets was estimated to be 1.395. About 1.5ml of a xylene-in-water emulsion made using 2wt.% CL particle dispersion with 0.25wt.% KHP at pH 4.5 was added to 500ml water with pH 4.5. Three sequential measurements were performed to get an volume average droplet diameter of 93 μm .

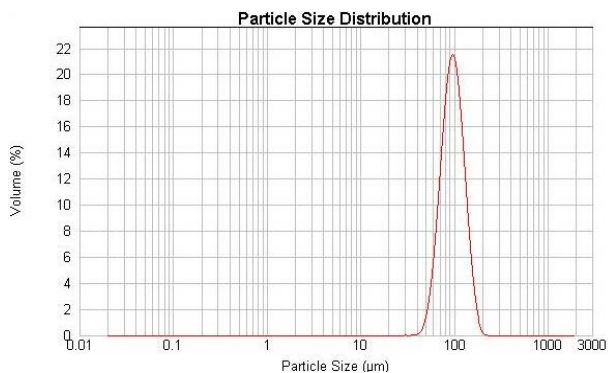


Figure 1 Emulsion droplet size distribution plot obtained using Malvern Mastersizer 2000

Dissolution of Alumina layer at low pH

To test the stability of the alumina layer at low pH, we adjusted the pH of a 2wt.% CL particle suspension to 1.5 and then observed the pH change vs. time.

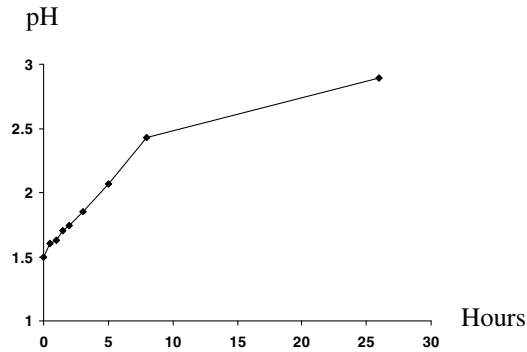


Figure 2 The pH development over time of a 2 wt.% CL particle suspension starting at pH 1.5 .

As we can see in **Figure 2** that suspension pH increases with time and the rate of pH increase rate decreases significantly with time. This is probably due to the dissolution of the alumina surface layer at low pH. The dissolution process consumes proton in solution, leading to pH increase. The dissolution is fast for the first 10 hours and then slows down. The zeta potential of the suspension after 30 hours is still positive, indicating presence of at least some alumina on particle surfaces. In light of these results, it appears prudent to minimize excursions to low pH values.