Emulsion Examples

Oil in water Pickering emulsions can be prepared by mixing 14 ml of aqueous dispersions of cellulose (the diluted cellulose hydrogel) at various concentrations ranging from 0.2% to 0.5%, with 6 ml of olive oil, by using a T18 UltraTurrax (IKA, Germany) at 16 000 RPM for 5 min. The emulsion's stability can be seen after centrifugation at 4000 RCF for 4 min, as indicated by the volume of the cream phase.

When mixing the aqueous dispersions of cellulose and olive oil, emulsions can be formed. This happens even when the used dispersion has a cellulose content lower than 0.2%. Fine cellulose fibrils are able to stabilize o/w emulsions by covering the interface between the oil droplets and surrounding water. However, after the centrifugation, the emulsions made by using the aqueous dispersions containing less than 0.2% of cellulose may completely collapse. As shown in the figure below, a clear phase separation between the oil and water can be seen. This is due to the compression occurred during the centrifugation, which leads to the coalescence of the droplets. When using the aqueous dispersions containing more than 0.2% of cellulose, the resulting emulsions can be maintained after the centrifugation. This is attributed to that the emulsion droplets are stable enough to prevent coalescence when they are forced together during the centrifugation. The formed cream phase is re-dispersible.

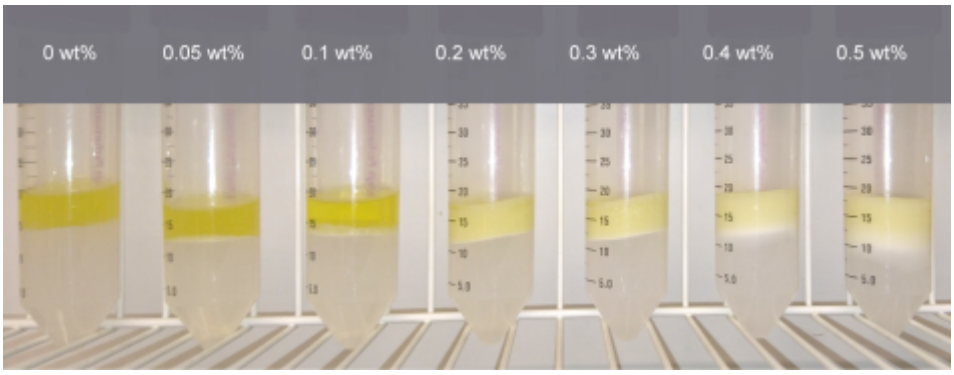

Figure. o/w Pickering emulsions after centrifugation. The emulsions were prepared by mixing aqueous dispersions of cellulose at different concentrations between 0-0.5%, with olive oil. The cream phase indicates a stable emulsion.