Effect of particle morphology on the structure and stability of particle stabilized water in water emulsions

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Water-in-water emulsions are formed when aqueous solutions of two incompatible polymers are mixed. This type of emulsion cannot be stabilized by surfactants as the interface is expressed only on length scales larger than the correlation length of the polymer solutions. However, in recent years it has been shown that water-in-water emulsions can be stabilized by colloidal particles. These so-called Pickering emulsions have been studied extensively for oil-in-water emulsions and were shown to be extremely stable. Mostly spherical particles were used for this purpose, but very recently it was shown that clay nano-platelets [1] are also effective stabilizers for W/W emulsions formed by mixing PEO and dextran solutions. Here we will show that even nano-rods formed by cellulose [2] or proteins can be used for this purpose. We have studied the effect of the morphology of particles with the same the chemical nature by comparing the behaviour of the emulsions in the presence of spherical microgels, fractal aggregates and rigid fibrils formed by heating the same globular proteins at different conditions. We will also discuss the effect of partitioning of the particles between the two phases.

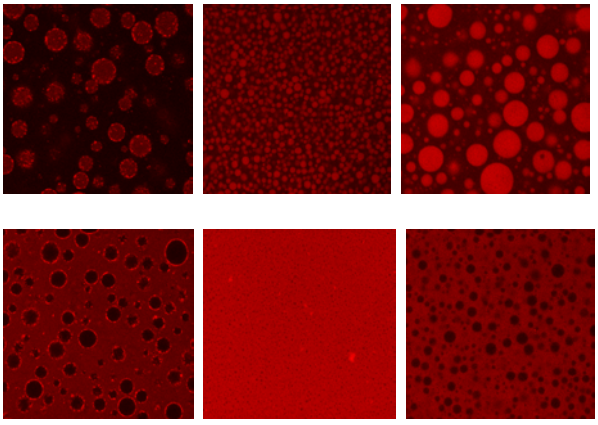

Figure 1 CLSM images (160x160 µm) of PEO in dextran (top) and dextran in PEO (bottom) emulsions in the presence of protein microgels (left), fractals (middle) and fibrils (right). The protein aggregates were fluorescently labeled.

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[2] M. Vis, J. Opdam, I.S. van't Oor, G. Soligno, G., R. van Roij, R. H. Tromp, Erné, B. H. *ACS Macro Lett.,* 2015, **4**, 965