**Nanomechanical properties of biocompatible particles: from bulk to interface**

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Pickering emulsions and foams are metastable dispersions of liquids or air in an immiscible liquid stabilized by solid particles. Compared to stabilization by surfactants, systems stabilized by particles offer extraordinary stability against coalescence and Ostwald ripening due to the orders of magnitude higher detachment energies of particles at the fluid-fluid interface. However, for many applications it is also crucial to be able to destabilize them on demand, e.g. release of oil droplets and flavours in the mouth, or oil dispersible active compounds on skin or leaf surfaces. To achieve such destabilization, via stimuli such as temperature, enzymes, shear or pH, the particles themselves have to be stimuli-responsive and consequently “biopolymeric microgels” (i.e., sub-micron-sized soft hydrogel particles) are the ideal candidate. Due to their deformability, microgels can be trapped in various configurations on adsorption at the interface - from highly spread, to compressed and close packed, and even collapsed. In this PhD, we will answer a series of questions: What is the relationship between such deformability and potential interpenetration of microgels, or penetration of the two phases into the microgel, and their stabilizing properties? How does the structure of single microgel particles change in response to the various stimuli? To answer these fundamental questions, knowledge of the nanomechanical properties of individual biocompatible particles in the bulk and at the interface, and their response to stimuli, becomes vitally important. Currently this knowledge is sparse because experimental techniques for measuring the physical properties of individual nanoscale soft materials are limited. In this interdisciplinary PhD project involving academics from Food Colloids, Nanoscale Physics and Collaborators from Pepsico, we aim to create a new understanding of the relationship between the properties of individual microgels and their collective properties at the interface and in the bulk, using a range of advanced interfacial and atomic force microscopy techniques.