Current techniques for making monodisperse droplets with sizes in the colloidal domain are either optimised for production of small, (sub)micron droplets or high throughput. [1-2]. Monodisperse micron-sized droplets pose interesting applications in the field of colloid science, as model systems, as well as in many other fields such as catalysis and sensing. They have proven to be a great tool in self-assembly of nanoparticles into organised structures (supraparticles, SPs) [3-5]. In this project, we aim to improve current parallelised step-emulsification systems by downscaling and increased parallelisation, in order to generate micron-sized droplets with high yield.

Drying droplets of dispersions of nanoparticles is a versatile method to generate ordered SPs [3-5]. Using this methodology, we can control the size of the nanoparticles, size of the supraparticles (by controlling the droplet size) and size of the suprastructures (by controlling the amount of supraparticles).

In our microfluidics chip, developed by collaborators at the University of Twente, droplets emerge from a shallow channel into a deep cavity containing the

continuous phase, as depicted in Figure 1b. The droplet size mainly depends on device geometry and its properties [1].

Analysis of the droplets is carried out using (confocal) fluorescence microscopy – by incorporation of a fluorescent dye inside the droplets – and static light scattering measurements. The formed supraparticles are analysed using transmission and scanning electron microscopy techniques, and also at a single particle level using 3D STED super-resolution microscopy on ultra-monodisperse fluorescent particles.