Controllable synthesis of double emulsion via phase inversion

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Double emulsions, the simplest form of multiple emulsion, have been intensively utilized in various industries as well as in fundamental research. A variety of strategies to effectively form double emulsions have been developed, but no simple yet controlled and scalable technique has been achieved yet. Herein, we examine the mechanism of the entire process of double emulsion formation by phase inversion, and we propose a universal one-step strategy for the formation of an oil/water/oil double emulsion using oil soluble polymers and hydrophobic silica nanoparticles. We demonstrate that this new approach enables control of both the fraction and the number of inner small droplets; even high internal phase double emulsions could be achieved.