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A scalable platform for functional emulsions JIE FENG, JANINE K. NUNES, SANGWOO SHIN, JING YAN, YONG LIN KONG, ROBERT K. PRUD'HOMME, Princeton University, LUBEN N. ARNAUDOV, SIMEON D. STOYANOV, Unilever research, HOWARD A. STONE, Princeton University — Bubble bursting at interfaces plays an important role in a spectrum of physical and biological phenomena, from foam evolution to mass transport across various interfaces. Recently, bubble bursting at an air/oil/water-with-surfactant compound interface was found to disperse submicrometer oil droplets into the water column (Feng et al. *Nature Phys.*, 2014). Inspired by this observation, we propose a new platform to generate functional oil-in-water nanoemulsions. We place functional materials in the appropriate phase, and document that the bubbling system has the capability to produce nanoemulsions encapsulating quantum dots, silica nanoparticles and lipid molecules. In addition, we demonstrate scaling up of the bubbling system and find that the produced nanoemulsions have good stability for days, which offers the flexibility of further treatments and functionalization. Considering the simplicity and energy efficiency of the new bubbling platform, together with the diversity of products and the potential for mass production, our one-step encapsulation system offers a new toolbox for generating (multi-)functional nanoemulsions and nanoparticles.

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