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Rapid Generation of Bionanoparticles Using Surface Wave Atomization and Nonuniform Evaporation MAR ALVAREZ, LESLIE YEO, JAMES FRIEND, MicroNanophysics Research Laboratory — We present the generation of relatively monodisperse nanoparticles via a two-step process, combining surface wave atomization through MHz-order Rayleigh instabilities induced on a source fluid and nonuniform evaporation post-atomization to obtain loosely bound agglomerations of biocompatible and degradable polymer nanoparticles. The process forms particles from the source fluid in fractions of a second, far faster than with other formation techniques, and we illustrate methods for controlling the particle diameter and morphology through a combination of polymer concentration, critical micelle concentration templating, and surface wave frequency and standing wave ratio, all in a handheld microdevice. High-speed microvideography, along with TEM, SEM, AFM and scanning mobility particle sizer data provides evidence to support our modelling of the atomization process, and the use of the technique to encapsulate bovine serum albumin (BSA), fluor-tagged biotin and fluorescent polystyrene particles demonstrate useful applications of the method.

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