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Biphasic nanoparticles made by electrified jetting

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Nano-colloids have recently attracted intense attention due to unique properties that are distinctly different from bulk solid-state materials; including unique magnetic, electronic, optical, chemical, and biological characteristics. The vision that these nano-objects could essentially act as functional components in novel device generations, which "magically" assemble following a master blueprint void any human manipulation, has resulted in a new "gold rush" in materials science. These concepts have results in the synthesis of a multitude of nano-objects, such as nano-wires, nano-rods, nano-disks, or nano-prisms. Recently, nano-particles with anisotropic materials distributions (biphasic nano-particles) moved in the focus of research. Our approach differs fundamentally from the above-mentioned methods in that it takes advantage of electrified polymer jets to create anisotropic materials distributions in nano-objects. jetting is a process to generate liquid jets by use of electrostatic forces. It is well-known that high electrical potentials (typically several thousand volts) applied between the jetting liquids that are fed through a capillary and a collecting substrate will induce jetting of a charged liquid. The differences in the final morphologies from similar processes are mainly determined by the properties of the jetting liquids and the process parameters. transmission electron microscopy, scanning electron microscopy, and scanning laser confocal microscopy, we demonstrate the applicability of the process to control size, shape, and materials distribution at the nanoscale. The resulting anisotropic nanoparticles may have potential applications for targeted drug delivery or as electro-rehological fluids.\ a) F. M. Van der Kooij, K. Kassapidou and H. N. W. Lekkerkerker, **Liquid crystal phase transitions in suspensions of polydisperse plate-like particles,** *Nature* **406**, 868 (2000); b) C. A. Mirkin, R. L. Letsinger, R. C. Mucic and J. J. Storhoff, **A DNA-based method for rationally assembling nano-particles into macroscopic materials**" *Nature* 382, 607 (1996); c) N. B. Bowden, M. Weck, I. S. Choi and G. M. Whitesides, **Molecule-mimetic chemistry and mesoscale self-assembly**, *Accounts of Chemical Research* **34**, 231 (2001).