

In-situ Nanofabrication via Countercharging Electrohydrodynamic Technology

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Over the last few years, there has been increasing interest in an electrohydrodynamic (EHD) technology to fabricate nano-scale materials such as fibers, vesicles, and hollow structures. In this study, countercharged EHD jetting technique was developed, for the first time, which results in neutralization and collision between as-sprayed and as-spun materials based on the Coulomb force. Negative and positive charges were supplied for fiber and particle fabrication on two identical nozzles consisting of stainless steel, respectively. The encountering phenomenon was observed under more than 8 kV electric field. Hydrophobic polystyrene particles of nano- to micro-sizes were anchored on the hydrophilic surface of polymethylmethacrylate (PMMA) nano- or micro-fibers. In another application, small organic molecules were successfully coated on the PMMA fibers. Gold nanoparticles dispersed in water were attached on PS string fibers.