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Dual Electrospray Pyrolysis for Mixed Metal Oxide (and Carbon) Composite Nanoparticle Synthesis with Applications in Energy Storage JUSTIN TANG, WEN LIU, HAILIANG WANG, ALESSANDRO GOMEZ, Yale University — We present a novel approach to synthesizing mixed metal oxide nanoparticles with a continuous, scalable aerosol flow process using the electrospray. The electrospray is a liquid atomization technique that generates a monodisperse population of highly charged liquid droplets over a broad size range (nanometric to tens of microns). Each liquid droplet serves as a micro-reactor, containing a payload of suitable precursors (such as metal nitrides), allowing for precise control over particle composition and size. By using two electrosprays of opposite polarities, the two highly charged droplets plumes are electrostatically mixed to produce a charge-neutral aerosol. Electrostatically driven droplet-droplet collisions can also be used to control morphology to some degree. This aerosol is passed through a tubular furnace via carrier gas, pyrolizing the precursors to synthesize nanomaterials. We apply this approach to manganese oxide, cobalt oxide, and carbon composite nanoparticles for use in energy storage applications.

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