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Sprayable, Paintable Layer-by-Layer Polyaniline Nanofiber/Graphene Electrodes for Electrochemical Energy Storage SE RA KWON, JU-WON JEON, JODIE LUTKENHAUS, Department of Chemical Engineering, Texas A&M University — Sprayable batteries are growing in interest for applications in structural energy storage and power or flexible power. Spray-assisted layer-by-layer (LbL) assembly, in which complementary species are alternately sprayed onto a surface, is particularly amenable toward this application. Here, we report on the fabrication of composite films containing polyaniline nanofibers (PANI NF) and graphene oxide (GO) sheets fabricated via spray-assisted LbL assembly. The resulting films are electrochemical reduced to yield PANI NF/electrochemically reduced graphene (ERGO) electrodes for use as a cathode in non-aqueous energy storage systems. Through the spray-assisted LbL process, the hybrid electrodes could be fabricated 74 times faster than competing dip-assisted LbL assembly. The resulting electrodes are highly porous (0.72 void fraction), and are comprised of 67 wt% PANI NF and 33 wt% ERGO. The sprayed electrodes showed better rate capability, higher specific power, as well as more stable cycle life than dip-assisted LbL electrodes. It is shown here that the spray-assisted LbL approach is well-suited towards the fabrication of paintable electrodes containing polyaniline nanofibers and electrochemically reduced graphene oxide sheets.

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