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Ultra-high density aligned Carbon-nanotube with controlled nano-morphology for supercapacitors MEHDI GHAFARI, RAN ZHAO, YANG LIU, YUE ZHOU, JIPING CHENG, penn state univeristy, ROBERTO GUZMAN DE VILLORIA, B.L WARDLE, MIT, Q.M. ZHANG, penn state univeristy — Recent advances in fabricating controlled-morphology vertically aligned carbon nanotubes (VA-CNTs) with ultrahigh volume fraction create unique opportunities for developing unconventional supercapacitors with ultra-high energy density, power density, and long charge/discharge cycle life. Continuous paths through inter-VA-CNT channels allow fast ion transport, and high electrical conduction of the aligned CNTs in the composite electrodes lead to fast discharge speed. We investigate the charge-discharge characteristics of VA-CNTs with >20 vol% of CNT and ionic liquids as electrolytes. By employing both the electric and electromechanical spectroscopies, as well as nanostructured materials characterization, the ion transport and storage behaviors in porous electrodes are studied. The results suggest pathways for optimizing the electrode morphology in supercapacitor-susings ultra-high volume fraction VA-CNTs to further enhance performance.

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