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Synthesis of single-walled carbon nanotubes and graphene composite in arc for ultracapacitors JIAN LI, XIAOQIAN CHENG, ALEXEY SHASHURIN, MICHAEL KEIDAR, Department of Mechanical and Aerospace Engineering, The George Washington University, GWU TEAM — Arc discharge supported by the erosion of graphite anode is considered as one of the most practical and efficient methods to synthesize various carbon nanostructures such as single-walled carbon nanotubes (SWCNT) and graphene with minimal defects and large yield due to the relatively high synthesis temperature and eco-friendly growth mechanism. By introducing a non-uniform magnetic field during synthesis process, large-scale graphene and high-purity SWCNT can be obtained in one step. In addition, the yield of graphene can be controlled by external parameters, such as the type and pressure of buffer gas, the temperature of substrate, and so on. Possessing the properties of highly accessible surface area and good electrical conductivity, the composite of graphene and SWCNT are promising nanomaterials for the electrodes of ultracapacitor, which can store electric energy with high level of capacitance. In this work, we fabricated electrodes of ultracapacitor based on nanostructures composite by wire-wound rod coating method, characterized them by SEM, EDX and Raman spectroscopy, and tested the performance by a potentiostat/galvanostat.

Jian Li
Department of Mechanical and Aerospace Engineering,
The George Washington University

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