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Morphology-controlled graphene aerogel for energy storage SON TRUONG NGUYEN, Department of Mechanical Engineering - National University of Singapore, HOA TIEN NGUYEN, School of Chemical and Biomedical Engineering - Nanyang Technological University, HAI MINH DUONG, Department of Mechanical Engineering - National University of Singapore — The development of new anode/cathode materials with highly conductive, non-corrosive, high specific surface area and high porosity for energy storage devices is highly desirable. Graphene aerogels has been focused emergently recently due to novel properties of the graphene. However, the aerogel-based application performance strongly depends on the morphology and structure of the graphene aerogels. The graphene aerogels with low-density have thinner struts, a different distribution of particle sizes, and less internal connectivity. This, in turn, changes the way the material can transport electric charge. As a result, the highest surface area graphene aerogels end up having the worst electrical conductivity, and the most conductive graphene aerogels have lowest surface areas. So the best designs of the developed graphene aerogel nanostructures in terms of pore size, porosity, density and mechanical properties for energy storage devices are essential. In this work, we develop a new fabrication method of graphene aerogels with well-controlled morphology and high electrical conductivity from graphene oxide through the supercritical drying process. The morphology and electrical conductivity of the graphene aerogels are controlled by the precursor contents and the synthesis conditions. The experimental results are very useful for experimentalists deciding the best graphene aerogel nanostructures for their needs.

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