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Dry Pressed Holey Graphene Composites for Li-air Battery Cathodes[1] STEVEN LACEY, University of Maryland, College Park, YI LIN, National Institute of Aerospace, LIANGBING HU, University of Maryland, College Park — Graphene is considered an "omnipotent" material due to its unique structural characteristics and chemical properties. By heating graphene powder in an open-ended tube furnace, a novel compressible carbon material, holey graphene (hG), can be created with controlled porosity and be further decorated with nano-sized catalysts to increase electrocatalytic activity. All hG-based materials were characterized using various microscopic and spectroscopic techniques to obtain morphological, topographical, and chemical information as well as to identify any disordered/crystalline phases. In this work, an additive-free dry press method was employed to press the hG composite materials into high mass loading mixed, sandwich, and double-decker Li-air cathode architectures using a hydraulic press. The sandwich and double-decker (i.e. Big Mac) cathode architectures are the first of its kind and can be discharged for more than 200 hours at a current density of 0.2 mA/cm^2. The scalable, binderless, and solventless dry press method and unique Li-air cathode architectures presented here greatly advance electrode fabrication possibilities and could promote future energy storage advancements.

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