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Chemically modified graphene-based composite paper electrodes for longcycle metal-ion batteries

Gurpreet Singh
Kansas State University, gurpreet@ksu.edu

CHEMICALLY MODIFIED GRAPHENE-BASED COMPOSITE PAPER ELECTRODES FOR LONG-CYCLE METAL-ION BATTERIES

Gurpreet Singh, Mechanical and Nuclear Engineering, Kansas State University
Email: gurpreet@ksu.edu

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Chemically modified graphenes (CMG) have garnered intense research interest as potential standalone as well as composite electrode materials for rechargeable alkali metal-ion batteries. CMG based electrodes offer high surface area, improved electrical conductivity and mechanical strength along with added value of mass production. Here, we will present data on recent success in synthesis of 2-D layered composites composed of molecular precursor-derived ceramic (PDC) and chemically modified graphenes. We will show that interfacing PDCs with graphene derivatives is an effective strategy in improving PDC's Li-ion electrochemical capacity, first cycle efficiency, and long-term cyclability. Flexible, lightweight, and mechanically robust nanostructured paper electrodes deliver Li-capacity of approximately 550 mAh/g (total electrode weight) with nearly 100 % coulombic efficiency for over 1000 cycles.
In addition, we also will discuss the role of thermal annealing on electrical conductivity, mechanical strength, and alkali metal-ion cyclability of pristine graphene oxide-based paper electrodes.

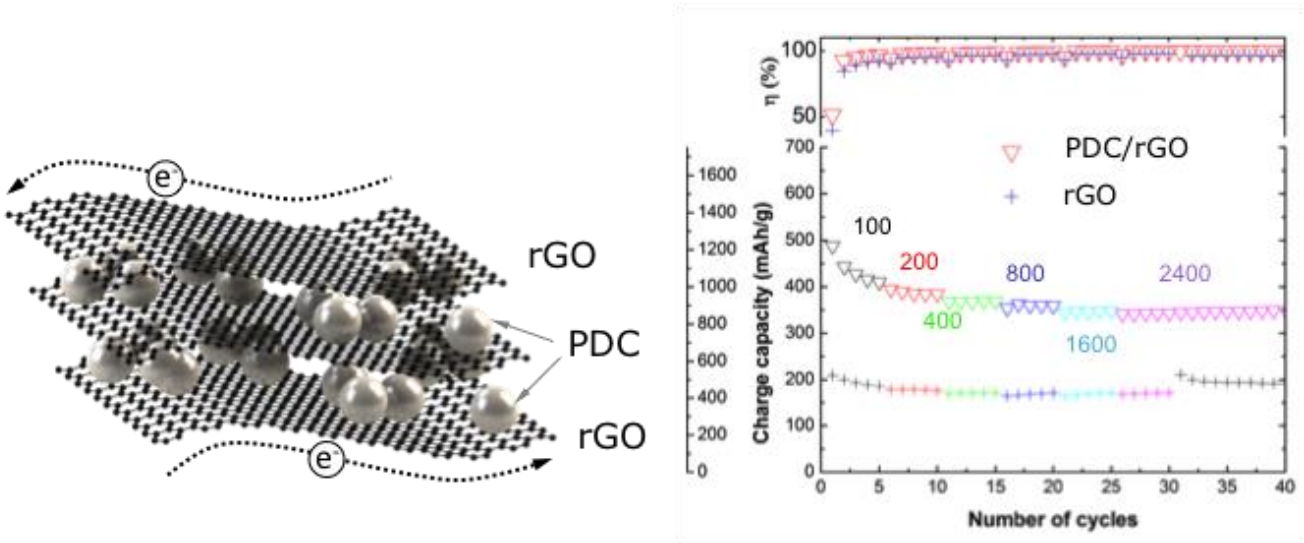

Figure 1 – Schematic of PDC/rGO composite paper. PDC provides high lithiation capacity while reduced graphene oxide (rGO) acts as a flexible support and electron conductor.