**Enhanced sheet properties of graphene oxide enabled by a novel phase transformation process**

Priyank V. KumarA

ASchool of chemical engineering, UNSW Sydney 2052 NSW Australia

Graphene oxide (GO) is a versatile, solution-processable candidate material for next-generation, large-area, ultrathin electronics, optoelectronics, energy conversion and storage technologies. GO is an atom-thick sheet of carbon functionalized with several oxygen-containing groups dominated by the epoxy and hydroxyl functional groups on the basal plane, with carboxyls and lactols at the sheet edges. It is well known that reduction of GO at temperatures > 150°C leads to the removal of oxygen atoms from the carbon plane, leading to the formation of reduced GO (rGO) structures. However, the material’s structure and its structural evolution at mild annealing temperatures (< 100°C) have been largely unexplored. I will show that a novel phase transformation can occur in GO at low annealing temperatures, which enhances its optical, electrical and chemical properties significantly. In this process, the oxygen atoms diffuse on the basal plane and undergo phase separation to form prominent oxidized and graphitic domains at mild annealing temperatures (50-80°C). I will then show how this phase transformation can be used to improve the fabrication of graphene thin-films, and for applications in electronic and biomedical cell-capture devices.

priyank.kumar@unsw.edu.au