

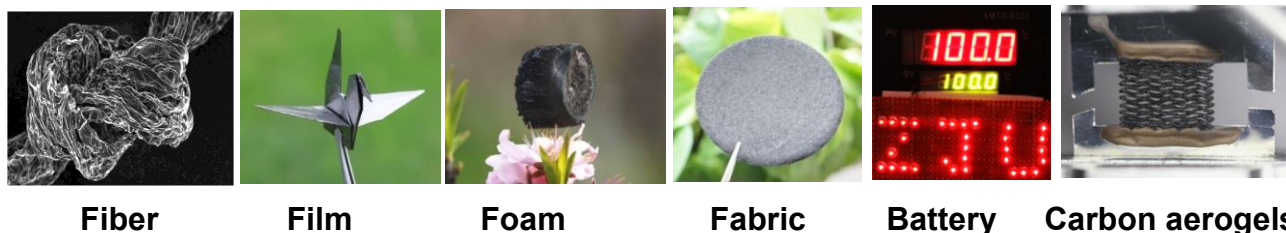
# Macro-assembly of Graphene: Multifunctional Materials and Devices

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Graphene has outstanding mechanical, electrical and thermal properties, which promote it to be an ideal building block for making multifunctional materials. Given the poor dispersibility of neat pristine graphene, graphene oxide (GO) was used as the raw material for macro-assembling. We found that GO is easy to form lyotropic liquid crystal (LC) in water and polar organic solvents. Wet-spinning of GO LC gave birth to continuous GO fiber. After chemical reduction and thermal annealing, mechanical strong and multifunctional graphene fibers were achieved. The graphene fibers were further assembled into flexible yarn supercapacitors. Similarly, graphene films with high flexibility and high thermal conductivity were obtained by wet-spinning assembly of GO LC followed by high temperature treatment. The graphene films were applied as cathode to fabricate aluminium-graphene battery that showed ultralong cycling life up to 250,000 times and ultrafast rate performance. Besides, graphene fabrics and highly elastic ultralight aerogels were achieved by macro-assembly of GO, opening the door for the wide applications of macro-assembled graphene materials.



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