

Graphene Nanoribbon Hydrogel: Viscoelastic Behavior and Use as a Molecular Separation Membrane

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The self-assembly of carbon materials such as graphene oxide, carbon nanotubes (CNTs) in aqueous system has been widely reported and used for various applications battery electrode, semiconductor, sensor, fiber spinning, catalyst, membranes, and so on. Herein, for the first time, the assembly of pure graphene nanoribbons (aspect ratio of 4000 ~ 40000) and its rheological properties are investigated by increasing the concentration of GNR aqueous solution up to 50 mg/mL. It is observed that GNR is assembled into macroporous scaffold in aqueous system which is made of entangled one-dimensional GNR. Rheology study reveals the typical viscoelastic behavior of GNR at concentration above 50 mg/mL, showing shear-thinning phenomena. By the aids of the viscoelastic property, high performance nanofiltration membrane can be fabricated by coating the GNR hydrogel on porous polymeric support using a simple bar-coating.