

The Liquid Crystal Behavior and Fiberization of 2D Graphitic Carbon Nitride

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Graphitic carbon nitride (g-CN), 2D semiconducting nanomaterial, has gained significant attention due to particular interest in optoelectronic and catalytic applications such as metal-free photocatalyst. However, these studies have been focused on powder materials that suffer from limited dispersibility, difficult recovery, and low surface accessibility resulting to its infancy. The use of 2D nanomaterials in a range of applications is their dispersion in solvents that can enable the solution process, which is critical from both fundamental and practical viewpoints like mass production.

Here, we studied that controlled g-CN with high anisotropy and expanded interlayer spacing could induce its true liquid crystal (LC) phase in concentrated sulfuric acid. In addition, various LC phase was observed by controlling the concentration of solvent and solution. At high concentration of 550 – 600 mg/mL, especially, the LC phase induced by MITCA-g-CN showed a Schlieren texture with a typical texture in the lyotropic nematic phase. More importantly, we fabricated a g-CN fiber as macroscopic structure based on an LC spinning technique for the first time.