

3D GRAPHENE-BASED ARCHITECTURES FOR ENVIRONMENTAL APPLICATIONS

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A new class of graphene-inorganic hybrid materials has been developed in recent years by combining graphene with metal-based compounds, especially metal oxides. As part of this research, we performed a comprehensive analysis on the modification of 3D graphene-based macrostructures (GBMs) as well as the investigation of their structural properties. Initially, 3D GBMs were prepared through vitamin C reduction, and further modified by atomic layer deposition (ALD) of alumina. The as-prepared 3D GBMs hybrid were also employed in tests of dye removal. Our research also presents a well-controlled method for preparing highly porous alumina that has not previously been reported, as well as a comprehensive analysis of the graphene-alumina hybrid material by means of high-resolution transmission electron microscopy performed on thin foil lamellas prepared by using focused ion beams. In conclusion, modified 3D GBM hybrid adsorbents improve dye adsorption isotherms significantly, and the potential mechanism involved is discussed.