

Lithographically defined 3D carbon patterns and their supercapacitor application

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Three-dimensional porous polymer structure was fabricated by interference lithography. The direct carbonization of 3D nanostructure has attracted interest for obtaining 3D carbon materials. The polymer flow and subsequent change occur during high temperature treatment. Liquid immersion thermal treatment was applied to enhance the thermal resistance and maintain the structural integrity during high temperature treatment. The thermal crosslinking reaction of structured polymer pattern was characterized. The 3D polymer pattern successfully converted to 3D carbon pattern via liquid immersion thermal treatment. Structured carbon pattern was applied to the supercapacitor after nitrogen doping for pseudocapacitance. The liquid immersion heat treatment can be extended to the carbonisation of various polymer or photoresist nanopatterns and also provide a facile way to control the surface energy of polymer nanopatterns for various purposes, for example, to block copolymer or surfactant self-assemblies.