

Method for Controlling the Structural Alignment in Carbon Fibers with Naturally High Turbostratic Disorder Using Heterogeneous Nucleation

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Technology Summary

It was discovered that incorporating nanoscale particles of a continuous sp² bonded network (Carbon nanotubes or graphene) leads to heterogeneous nucleation of a graphite like structure with a specific interface. Inventors incorporated nanoparticles during compounding and pelletizing of a carbon fiber precursor that naturally forms structure with high turbostratic disorder (such as lignin). Using conventional melt processing techniques with high draw ratios it is possible to cause alignment of the particles during melt processing. The particles aligned along the fiber direction, resulting in control of nuclei by forming specific low energy interfaces (basal plan of the second phase and graphite forming matrix align along basal planes). This result is important when forming structural or functional carbon fibers from natural precursors that tend to form a randomly oriented graphitic structure. Structural alignment along the fiber direction has been identified as key to the forming structural materials with competitive mechanical properties.

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