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A Method for Producing Hexagonal Boron Nitride Composites with Scaffold-like Interconnected Internal Architecture

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Description

- Contiguous, foam-like hexagonal boron nitride (h-BN) nanomaterials are created using a simple, low-cost atmospheric pressure chemical vapor deposition approach
- On its own, the h-BN foam is stable up to hundreds of degrees Celsius and chemically inert.
- The open cells of the foam can be impregnated with various polymers (acrylates, elastomers, etc.) to form thermally conducting, electrically insulting composites

Advantages

(1) Unlike most thermal composites used today, the novel lattice-like internal architecture reduces or eliminates the performance-degrading influence of interfacial thermal resistance, thereby facilitating large increases in thermal conductivity for very low filler percent volume.

(2) The method used to create the material is done at atmospheric pressure, unlike many existing methods done at low pressure that require additional pumps, fittings, and other components which increase complexity and cost.

(3) The resulting material and the composites it can form have high thermal conductivity while remaining electrically insulating.

Areas of Application

- For ceramic composites, high temperature components such as in gas turbines, combustion chambers, and aerospace applications
- For polymer-based composites, any application for which thermally conducting, electrically insulating properties are desirable but particularly electronics packaging (thermal interface materials, chip underfills,

Patent Status

- Patent pending

Publications

- Ashton, T. S., and Moore, A. L., "Three-dimensional Foam-like Hexagonal Boron Nitride Nanomaterials via Atmospheric Pressure Chemical Vapor Deposition," *Journal of Materials Science* **50**(18), 2015, pp. 6220-6226. DOI: 10.1007/s10853-015-9180-0