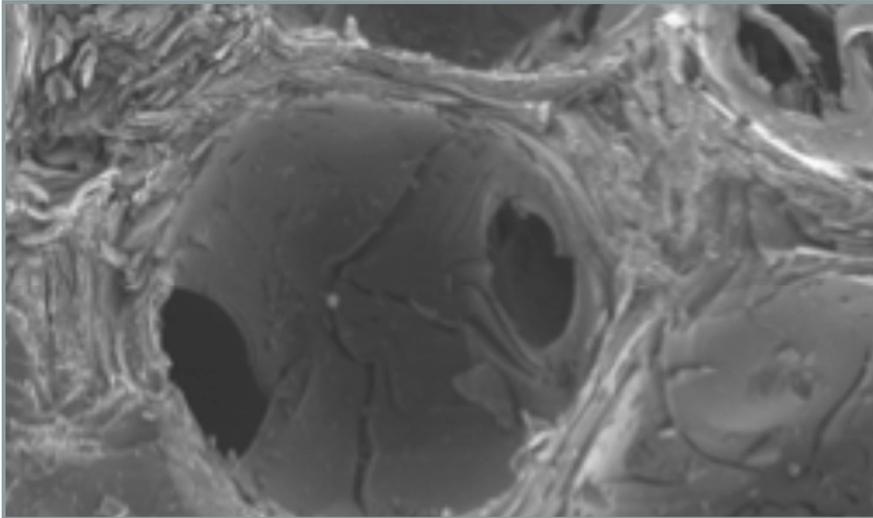


Thermally Conductive Graphite Foam

UT-B IDs 199600248, 199800445, 199900728, 199900722, 199900727, 200000788, 200000861, 200201063, 200000892



Technology Summary

Researchers at ORNL developed a highly thermally conductive graphite foam material that addresses a variety of needs for numerous industries. These foams are of varying degrees of porosity and density but provide a thermal conductivity equivalent to aluminum alloys at substantially less weight.

The invention has an open porous structure with more than 100 times greater surface area than typical heat exchangers ($>20 \text{ m}^2/\text{g}$). The cell walls are made of highly oriented graphite planes, similar to high performance carbon fibers, which have been estimated to exhibit a thermal conductivity greater than $1700 \text{ W/m}\cdot\text{K}$ (copper is $400 \text{ W/m}\cdot\text{K}$). The foam also exhibits excellent RF shielding and acoustic management properties.

The technology is currently licensed to two companies to manufacture the foam: Koppers, Inc. (Contact: Tom Golubic, 412-826-3955) and POCO Graphite (Contact: Lee Wiechmann, 940-393-4324). However, ORNL has patent claims not only on the methods of manufacture and the composition of the foam, but also on applications. Therefore, there are a variety of end uses that may still be exploited on an exclusive basis.

Advantages

- Very high, uniform thermal conductivity
- Low weight
- Easily machinable

Potential Applications

- Power electronics cooling
- Thermoelectric devices
- Radiators
- EMI shielding

Patents

James W. Klett, *Process for Making Carbon Foam*, U.S. Patent 6,033,506, issued March 7, 2000.

James W. Klett and Timothy D. Burchell, *Pitch-based Carbon Foam Heat Sink with Phase Change Material*, U.S. Patent 6,037,032, issued March 14, 2000; U.S. Patent 6,399,149, issued June 4, 2002; U.S. Patent 6,780,505, issued August 24, 2004; U.S. Patent 7,014,151, issued March 21, 2006; U.S. Patent 7,157,019 issued January 2, 2007; U.S. Patent 7,166,237 issued January 23, 2007.

James W. Klett, *Pitch-based Carbon Foam and Composites*, U.S. Patent 6,261,485, issued July 17, 2001; U.S. Patent 6,387,343, issued May 14, 2002; U.S. Patent 6,656,443, issued December 2, 2003; U.S. Patent 6,663,842, issued December 16, 2003.

Lead Inventor

James Klett
Materials Science Division
Oak Ridge National Laboratory

Licensing Contact

Alexander G. DeTrana
Technology Commercialization, Materials Science
UT-Battelle, LLC
Oak Ridge National Laboratory
Office Phone: 865.576.9682
E-mail: detranaag@ornl.gov

