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Submicrometer Carbon Spheres and Composites: Rapid Production and their Tribology Applications

A new, scalable fabrication method creates mechanically and chemically stable carbon spheres that act as nanoscale ball bearings in engine oil, substantially reducing friction and wear without altering viscosity.

The tribological performances of traditional fluid lubricants do not meet the demands of new generation mechanical devices. Although a number of solid additives, including carbon, are demonstrated as potential lubricant additives, their large scale production is challenging. In spite of the good tribological behavior of current solid oil additives, there are several concerns about the complex synthetic methods, toxicity, and high cost. Another serious issue is the performance degradation on prolonged use due to poor mechanical and chemical stability of the solid additives.

Researchers at Purdue University have developed a new technology for the manufacturing and application of carbon spheres for tribological applications. By adding carbon spheres fabricated by ultrasound-assisted polymerization to standard engine oil, the perfectly spherical shape of carbon additive fills the gap between surfaces and acts as a nanoscale ball bearing. As a result, this hybrid lubricant is well suited for applications where lubricating oils are used.

Advantages:

-The hybrid lubricant exhibits a substantial reduction in friction and wear without changing viscosity.

-The carbon spheres are mechanically and chemically stable.

-The fabrication method developed is far more scalable for commercial use than prior methods

Potential Applications:

-Lubricant for machines

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Category

Chemicals & Advanced Materials/Specialty & Performance Chemicals
Materials Science & Nanotechnology/Nanomaterials & Nanostructures
Materials Science & Nanotechnology/Thermal Management Materials & Solutions

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