

Nanocoatings Can Save Energy, Costs

August 23 2004

Argonne's Energy Technology Division (ET) provides innovative materials and engineering solutions to national energy challenges that range from energy production and conservation to transportation.

In 2003, nanostructured carbide-derived [carbon](#) (CDC) technology for sliding and rotating equipment received an R&D 100 award. CDC is grown with graphite, diamond, amorphous carbon and carbon "nano-onions" -- small carbon structures with concentric rings, resembling an onion. These components vary from 2 to 10 nanometers in thickness (one nanometer is one-billionth of a meter).

Industrial partners are interested in using the coating to seal water pumps in automotive engines to prevent dry-run failure and extend the engine's lifetime. This coating may save billions of dollars and reduce energy consumption.

Because it is created with nano-layers, the coating bonds strongly to its substrates under severe loading or sliding conditions. CDC has exceptional friction and wear resistance in wet, dry and high-temperature environments.

The CDC technology was developed by ET's Ali Erdemir along with colleagues Michael J. McNallan of the University of Illinois at Chicago, Yury Gogotsi of the A. J. Drexel Nanotechnology Institute, and students Sascha Weiz and Daniel Ersoy of the University of Illinois at Chicago.

Their research was funded by the Department of Energy Office of

Energy Efficiency and Renewable Energy, Office of Industrial Technologies, Industrial Materials of the Future Program.

Source: Argonne

Citation: Nanocoatings Can Save Energy, Costs (2004, August 23) retrieved 20 March 2024 from <https://phys.org/news/2004-08-nanocoatings-energy.html>

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