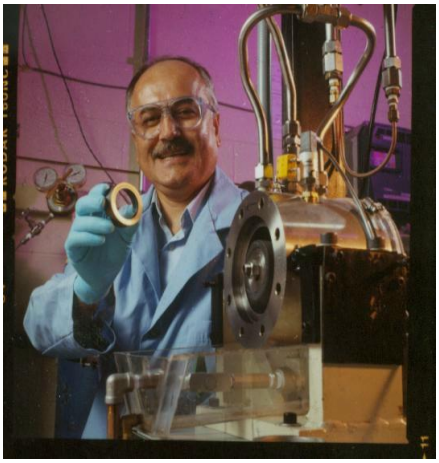
Nanostructured Carbide Derived Carbon (CDC)

Argonne National Laboratory

The Nanostructured Carbide Derived Carbon (CDC) technology is a coating for sliding and rotating equipment applications. The coating can be grown at rates up to 100 micrometers per hour and is composed of graphite, diamond, amorphous carbon and carbon "nano-onions" (small carbon structures with concentric rings, resembling an onion). These components vary between 2 to 10 nanometers in thickness (one nanometer is one-billionth of a meter).

Because of graded interface, the coating has a strong bonding to its substrates and does not delaminate under severe loading or sliding conditions. CDC has exceptional friction and wear resistance in many environments, such as wet, dry and high-temperature environments.



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. The development of this coating could save billions of dollars and reduce energy consumption.

Ali Erdemir of Argonne's Energy Technology Division developed the CDC technology 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.

This is Erdemir's third R&D award. He received awards in 1991 and 1998 for a Boric Acid Lubricant and a Near Frictionless Carbon Coating, respectively.

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