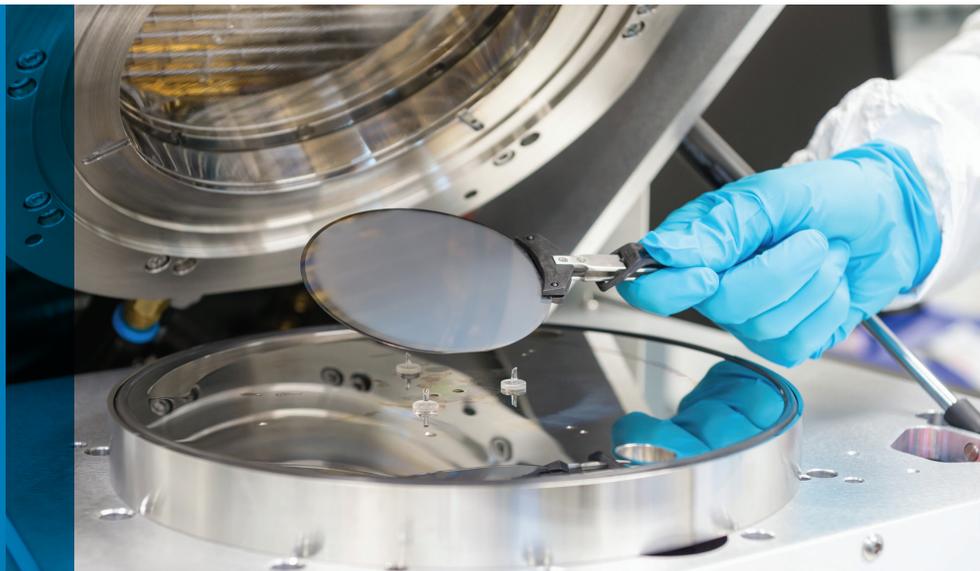


MAKE YOUR BUSINESS RUN SMOOTHLY

Graphene research at Argonne National Laboratory



Argonne's wafer-scale graphene technology and nanodiamond-graphene process won TechConnect Innovation Awards in 2017 and 2016, respectively.

The TechConnect Innovation Awards recognize the top 15% early-stage innovations submitted from around the world through an industry-review process.

Argonne National Laboratory has patented technology to produce wafer-scale graphene that helps electronics run faster, cooler, more efficiently, and at a lower cost.

GRAPHENE IN ELECTRONICS

What if you only had to charge your phone twice a year? What if sensors were 100 times as smart and half the size they are today?

Thanks to work by researchers at the U.S. Department of Energy's Argonne National Laboratory, those scenarios aren't as outlandish as they might sound.

Argonne has patented technology to produce wafer-scale graphene that helps electronics run faster, cooler, more efficiently, and at a lower cost.

Graphene has only been around for a decade, but it is growing fast. Whether it be graphene-based RF electronics, battery electrodes with high thermal conductivities, or technology for fabricating ultrasensitive sensors, the market for graphene is expected to continue to grow.

GRAPHENE AS A "SUPERLUBRICANT"

Argonne researchers are using graphene coupled with nanodiamonds to reduce friction to near zero. They call the effect "superlubricity," and it is a very enticing prospect for industries that spend tens of billions of dollars annually to mitigate the effects of friction in gears, ball bearings, and turbines, to name a few.

The Argonne technology offers multiple critical advantages over existing products:

- It achieves near-zero friction, which greatly reduces energy consumption and wear on parts.
- It is cheaper than existing solutions. Most industry-standard lubricant coatings must be deposited in a vacuum, requiring costly equipment and limiting the process to parts that fit inside that equipment. The Argonne technology can be applied in air without the use of a vacuum.

- The mixture is extremely long-lasting. Two surfaces can slide nearly four kilometers on a single drop before the drop needs replenishing.

The nanodiamond-graphene process requires a dry environment, with humidity below 30%. But Argonne has also developed a graphene-only spray for situations in which dryness is impossible. It doesn't achieve superlubricity, but it reduces friction between two sliding steel surfaces by six times and wear by 10,000 times.

Argonne is actively seeking industry partners with interest in licensing these technologies or collaborating with Argonne on further development.

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