

Using Nanotechnology to Make Vehicles Lighter, Safer and More Sustainable



BMW is the latest auto manufacturer to get behind a nanotech company that uses extremely small things to make big gains.

The study and application of extremely small things, nanotechnology can be used across all the other science fields, including chemistry, biology, physics, materials science and engineering. And while it's difficult to imagine just how "small" these things are, and the official definition of a nanometer is a billionth of a meter, these examples may help:

- There are 25,400,000 nanometers in an inch
- A sheet of newspaper is about 100,000 nanometers thick
- If a marble was a nanometer, then one meter would be the size of the earth

Today, scientists and engineers are finding new ways to deliberately make materials at the nanoscale in order to take advantage of their enhanced properties such as higher strength, lighter weight, increased control of light spectrum and greater chemical reactivity than their larger-scale counterparts.

BMW Gets Behind Nanotech

This month, BMW invested in actnano, a startup firm that has developed a next-generation "nanocoating" used in both automotive and consumer electronics. According to [actnano's website](#), the company has been around since 2012. Its Advanced nanoGUARD product protects vehicle electronics like advanced driver assistance systems, in-cabin electronics, autonomous vehicle systems and under-hood applications (among others) from water damage and harsh environmental conditions.

In August, the company introduced its Titan coating, which protects automotive electronics from harsh environmental conditions like water, condensation, salt and humidity. Titan also maintains stability over a wide range of operating temperatures. "What makes Titan unique is that it protects 100% of the electronics and allows tunnel-through electrical conductivity at connection points after application," actnano's Jeremy Garbacik said in a [press release](#).

"And unlike traditional conformal coatings, it can be applied to connectors and antennas, as well as underneath large components/processors," Garbacik continued. "This saves valuable time and reduces costs for our customers, because it eliminates the extra steps required for masking and the need for keep-out areas."

When it comes to actnano's technology, BMW clearly liked what it was seeing. "The so-called NanoGUARD technology from actnano is a thin nano structure sprayed directly on a desired electronic component, acting as an insulation barrier to protect the underlying component from various environmental contaminants such as water, condensation, humidity, and salt," Gabriel Nica points out in the [BMW blog](#) announcing the investment.

"It may be applied on connectors and antennae, as well as below massive components and CPUs, without requiring masking, unlike standard coatings," writes Nica, who goes on to say that actnano's technology also has considerable cost advantages over existing options and is simple to use in production processes, drying in less than 30 sec.

“The proliferation of electronics in the car, especially with the broader industry push toward autonomous driving and electrification, will necessitate greater protection of mission-critical electronic components in the vehicle,” said Kasper Sage, managing partner at BMW i Ventures, in the blog. “actnano’s nanocoatings have proven to be superior in performance and bring distinct cost-advantages compared to traditional alternatives, making it a game-changer to secure generations of vehicles to come.”

The Sustainability of Nanotech

Given the nano’s tiny scale, companies haven’t had the technology to work with these materials extensively until relatively recently, according to Oscar Collins. In “[How Nanotechnology Has Improved the Auto Industry](#),” he writes about how automakers have taken a “particular interest” in nanotechnology with the goals of reducing the weight, increasing the durability and improving the sustainability of their automobiles.

“Since nanotechnology makes cars lighter, it makes them more fuel-efficient, leading to fewer carbon emissions,” Collins writes. “Nano carbons also have a thermal conductivity five times higher than other materials, reducing heat waste to improve efficiency further.”

Nanotechnology also has green applications beyond increasing the efficiency of fossil fuel cars. For example, nano engineers recently developed methods for embedding silicon nanoparticles into graphene battery components to make lithium-silicon batteries. This technology can make batteries last 20% longer per charge, making electric cars a more viable option.

“Nanotechnology also paves the way for thinner, more efficient hydrogen fuel cells. These technologies provide another green alternative to fossil fuel cars, producing water and heat as their only emissions,” Collins writes. “As these sustainable alternatives improve, car owners will have more options for zero-emission vehicles.”