

NANOFILM

What is nanotechnology?

Nanotechnology means, at its most basic level, technology measured in nanometers or 1 billionth of a meter. How small is that? It measures only a few atoms or molecules, making it about 1/10,000th the thickness of a sheet of paper or 1/50,000th of the thickness of a human hair.

What's the excitement about? Changes in size can change the rules.

A nanofilm can be so thin that it's invisible. That allows performance properties to be added at the surface of an object without affecting the underlying substrate, enabling characteristics that might be impossible to add otherwise. For example, a nanocoating could help make steel resistant to contaminants or a bandage resistant to germs.

Nanoscale materials can also be added to bulk materials in enough concentration to lend them new properties. For example, nanoscale carbon is added to the polymer in a tennis racket to add strength.

Nanomaterials can also have very different properties from their bulk versions. A cubic meter of a material has the same properties as a cubic millimeter. But a nanoscale substance of a few atoms or molecules may exhibit new properties, such as electrical conductivity, magnetism, heat transfer, light absorbance or fluorescence.

These materials – and this technology – open the door to innovation in virtually every area of science and life: material science, chemistry, biology and engineering.

The world is already beginning to benefit from the potential of nanotechnology.

Nanotechnology is already at work in products from water filtration to eyeglass lenses, CDs and electronic displays to medical testing, anti-bacterial sportswear to car parts. The future promises greater breakthroughs. It is believed that nanotechnology advances will hold the keys to more efficient solar energy, disease treatments, and smaller, more powerful computers.

Nanoscale materials are part of our natural world, and examples surround us.

The nanoscale design of lotus leaves is the inspiration for water-resistant coatings. Our bodies rely on natural nanoscale proteins to function. Nanoparticles are present in volcanic ash and sea spray.