

# Nanotechnology making leaps in various fields

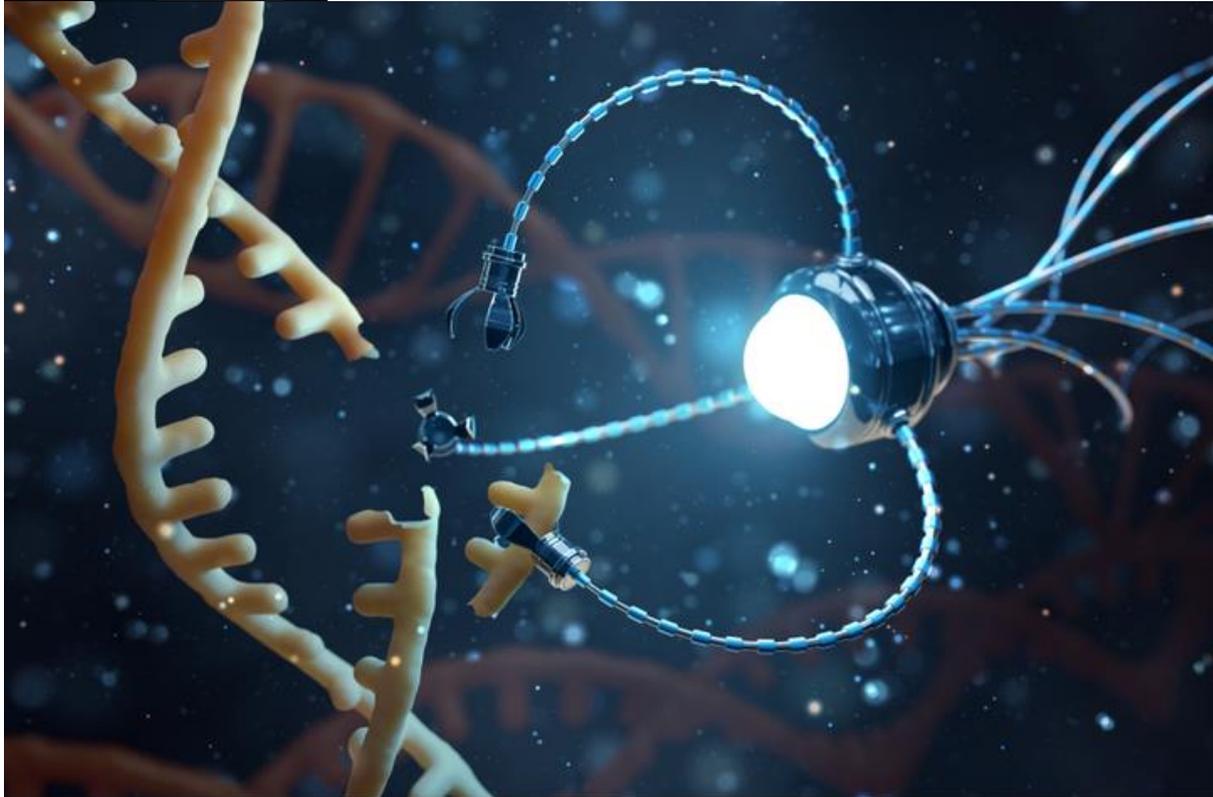
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Nanotechnology has made its leap into different sectors ranging from healthcare to military. Almost every sector finds application of nanotechnology to innovate and find new methods to make the feats possible that were impossible before. From the [wine industry](#) to tattooing, this technology has been utilized in various ways.

In the wine sector, nanotechnology would solve the problems occurring at a molecular level. Moreover, tattooing can be used to conduct electricity and

power implantable devices in the body. The prototype has been made and further developments would give promising results.

In military applications, it can be utilized in self-repair, corrosion control, select removal, and other applications. The implementation of nanotechnology is on the rise. According to the research firm Allied Market Research, the **global nanotechnology market** is expected to generate \$2.23 billion by 2025. Following are some of the applications that would shape the course of industry in coming years:

### **Nanotechnology for elimination of wine faults:**

As **nanotechnology** can be utilized in innovative applications, one of its application include removal of wine faults. Wine Australia outlined that nanotechnology can have a considerable impact on the wine industry and can solve wide range of problems occurring at a molecular level.

Researchers from the University of Adelaide utilized nanotechnology for development of a polymer that could eliminate a methoxypyrazine, the compound that produces the 'green capsicum' aroma, from Cabernet Sauvignon wine. The magnetic nanoparticles were attached to the polymers and extracted with the help of magnets.

**David Jeffery, the lead researcher and Associate Professor** in Wine Science said that though the polymers needed fine tuning for development of process at scale, they can be utilized for smoke or cork taint removal. This research was built upon the research done by a team at the **Australian Wine Research Institute**(AWRI).

The team developed a technique through which magnetic separation was carried out to part haze proteins from wine in an efficient manner. This technique involved binding of haze proteins to plasma polymer of acrylic acid that was coated with magnetic nanoparticles.

**Dr. Agnieszka Mierczynska-Vasilev** from the AWRI's outlined that the process was solvent free, fast, and could be implemented at the low temperature. Moreover, it did not require any surface activation or pre-treatment. She added that nanotechnology had a bright future in the wine industry as it made the management of wine at the molecular level possible.

## **Smart tattoos to measure pH, glucose, and body temperature:**

Tattoos, in future, will not remain only body art. They will become medically functional and offer statistics on levels of glucose, pH, and other biomarkers. A team of researchers at the Technical University of Munich, Germany have identified three chemical sensors that undergo change in color if the levels of albumin, glucose, or pH changes.

The first sensor changes the color to green with presence of albumin. The decrease in level of this protein points toward the liver or kidney failure. Next sensor changes the color to dark green with an increase in glucose levels. High level of glucose points toward poor management of diabetes.

If the third sensor turns from yellow to blue, it indicates the increase in pH level from acidic to alkaline. The testing has been carried out on the pig skin. The additional testing will be needed if it needs to be used on people.

Moreover, another group of researchers at the University of Colorado Boulder have been working on a tattoo prototype that would conduct electricity. These tattoos can be helpful for recharging biological implants. The electricity can be sent along the tattoo to the device implanted in the body.

Carson Bruns, PhD and the lead of the team of researchers outlined that though tattoos cannot send the electricity equivalent to copper wire, the

technology can see the light of the day. He added that the team is making progress and it would open up a whole new set of opportunities.

Technologies will be merged with our bodies with tattoo-able wires and electronics and will feel as an extension of our bodies rather than external devices.

### **Nanotechnology for military applications:**

As nanotechnology has made leaps into different fields, the U.S. Army has been devising various ways to employ it in various applications.

Researchers and developers have collaborated to integrate nanotechnology into self-repair, corrosion control, select removal, and undetectable coatings.

There will be a protective layer on sensitive surfaces of military gadgets and equipment. Moreover, nano-sensors would improve the functionality of defense machinery and enable detection of toxic environments. They can also be used for detection of functional and structural micro-anomalies.

The highly-unstable nature of nano-sized particles are capable of releasing energetic waves. They can act as a fuel for long-range missiles. For propulsion purposes, nanotechnology can play a crucial part in achieving short combustion time and rapid ignition.