



Activity 1 – Case Studies of Applications

1. Medicine

Au-NP are being used in cancer therapies. They are so small they can be delivered exactly where needed, and they can be functionalised with antibodies/peptides/ which are overexpressed by certain cancers. This way, the particles can be targeted to go to exactly where they are needed. Once inside the tumour, they are heated through hyperthermia to kill the tumour cells.¹ Au-NP's can also be used in drug delivery and imaging.

2. Engineering

Nanoelectronics are now used in mobile phones, laptops and TV's (among other things). Most of the nanoelectronics are transistors, that are so small that inter-atomic interactions and quantum mechanics dominate. The advantage is that many more transistors can be put onto a single chip, which increases the device's speed, memory and capacity. On top of that, the nanotubes allow for higher electron mobility.²

3. Cosmetic Industry

Liposomes are structures which are used in the cosmetic industry as delivery vehicles for skin care, because they provide enhanced skin hydration and bioavailability, and can be more stable than any other form of drug delivery. Nanocrystals and nanoemulsions are also being investigated for cosmetic applications. Additionally, patents have been filed for the application of dendrimers in the cosmetics industry. L'Oréal, who are actually the sixth largest company in the US for nanotechnology patents, have been using polymer nanocapsules as delivery agents for ingredients like Vitamin A to get them to the deeper layers of skin. It was one of the first companies to use

¹ Giustini AJ, Petryk AA, Cassim SM, Tate JA, Baker I, Hoopes PJ. MAGNETIC NANOPARTICLE HYPERTHERMIA IN CANCER TREATMENT. Nano Life. 2010;1(1n02):10.1142

² National Nanotechnology Initiative, <https://www.nano.gov/you/nanotechnology-benefits> , Accessed 07/12/18.



nanoparticles for commercial use in cosmetics; in 1998 they introduced Plentitude Revitalift, which is an anti-wrinkle cream using nanoparticles.³

Can you think of any more applications of nanotechnology in everyday life?

³ Nanowerk, <https://www.nanowerk.com/nanotechnology-in-cosmetics.php>