



Implantable sensors based on gold nanoparticles

Implantable sensors are designed to provide patients and doctors with continuous information about vital signs and concentrations of medically relevant substances and medicines. This helps to ensure that the course of diseases and therapies can be permanently recorded and monitored. The problem with the sensors currently on the market is that their lifespan and retention time in the body is often only a few days before they have to be replaced again.

A new generation of sensors now promises a more long-term approach. The implantable sensor should be able to be worn in the body for several months without causing rejection reactions or transmission errors. This is made possible by the use of dimensionally stable gold nanoparticles that also contain receptors for certain molecules. An artificial tissue made of polymers encloses the nanogold and is implanted under the skin in this way.

To ensure that the gold nanoparticles stay in one and the same place in the body, they are also embedded in a porous hydrogel that has a tissue-like consistency. Once the implant is under the skin, small blood vessels and cells grow into the pores so that the implant is fully integrated into the body's own tissue. The implant is about the size of a one cent coin and is thinner than 1 millimetre.

One characteristic of gold nanoparticles that researchers are now taking advantage of is their reaction to light. Gold nanoparticles react quickly and reliably to changes in the environment and present this through colour changes. So as soon as there are changes in the concentration of a drug or medicinal substance, the sensor changes colour. Drug molecules are passed through the bloodstream to the implanted sensor, where they are bound by the corresponding receptors and cause a colour change. The technology is equivalent to an invisible tattoo that is initially invisible to the naked eye on the skin. However, by using a special measuring device, this can be changed and made visible in a non-invasive way.

INNOVATIVE TECHNOLOGICAL APPROACH

◇ **Technological basis:**
Implantable sensors based on gold nanoparticles

◇ **Advantages:**
Reduction of body event rejection reactions

Longer service life

Non-invasive measurement of drug concentrations

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