

TITLE

Polyelectrolyte-stabilized gold nanoparticles of different size and shape

Joachim Koetz

University of Potsdam, Germany

The synthesis of well defined nanoparticles in the size range < 100 nm has received much attention since they can offer highly promising and novel options for a wide range of technical applications. Gold nanoparticles are of special interest due to their prominent optical resonance in the visible range and their shape dependent optical properties. Several methods can be employed for the synthesis of gold nanoparticles. An example of widespread usage is the water based reduction of a diluted tetrachloroaurate solution by citrate, introduced by Turkevich. Nevertheless, the stability of the formed gold nanoparticles is limited due to the fact that they are only electrostatically stabilized. Recently, it was shown that polyelectrolytes can reduce a gold chloride solution, too, and can stabilize gold nanoparticles of very small dimensions. The advantage of this procedure is that the produced gold nanoparticles are much more stable, that means electrostatically stabilized. We have checked different types of polyelectrolytes as potential new agents as reducing and stabilizing agent: By using oligosaccharide-modified poly (ethyleneimines) (PEI) fluorescent, biocompatible core-shell gold nanoparticles with particle diameters of about 3 nm can be produced.

In presence of a vesicle template phase gold nanorods and large triangular structures are formed. In comparison to this water based processes the reduction process with PEI can be realized also in ionic liquids and in microemulsions. The finally obtained gold nanoparticles can be used as fluorescent markers and can be successfully incorporated into biosensors.

Biography

Joachim Koetz studied chemistry at the Martin-Luther University Halle/Wittenberg and obtained his PhD in 1986 from the Academy of Science. He worked in the Institute of Polymer Chemistry in Teltow-Seehof, and since 1994 he has been Professor of Colloid Chemistry at the University of Potsdam. His main interests are polyelectrolytes, liquid crystalline systems and microemulsions as template phases for the nanoparticle formation. He published above 140 papers (including 2 books and above 10 book chapters), and gave more than 100 lectures at national and international conferences.