PO 3.21

Determination of the Surface Coverage of DNA Conjugated Gold Nanoparticles by Simultaneous Determination of Gold and Phosphorus

Andy Scheffer[1], Thorben Pfeifer[1], B. Yamilet Mejia-Radillo[2,3], Ernesto Carillo-Nava[2,3], Hans-Jürgen Hinz[2,3] and Wolfgang Buscher[1,3]

[1] University of Münster, Institute of Inorganic and Analytical Chemistry, Corrensstrasse 30, 48149 Münster, Germany, wolfgang.buscher@uni-muenster.de

[2] University of Münster, Institute of Physical Chemistry, Corrensstrasse 30, 48149 Münster, Germany

[3] Center for Nanotechnology (CeNTech), Heisenbergstr. 11, 48149 Münster, Germany

Functionalized gold nanoparticles play a major role in bioanalytical applications, due to their unique optical and chemical properties. Gold nanoparticles conjugated with oligonucleotides, for instance, have been employed as probes in a variety of DNA detection methods due to their sequence-specific hybridization properties. Their potential in bioanalytical applications results from an increased selectivity that can be used to discriminate perfectly complementary DNA or RNA targets from those with single-base mismatches.

For the quantitative analysis of the aggregation-linked assays, it is essential to know the exact number of oligonucleotides attached to one nanoparticle. In this study it could be demonstrated, that inductively coupled plasma spectrometry (ICP) is well suited to determine phosphorus and gold concentrations in functionalized gold nanoparticles in a simultaneous fashion, thereby rendering possible the determination of oligonucleotide coverage. During the analysis, phosphorus in gold conjugated oligonucleotides and unbound phosphate in solution have been differentiated. Methodology and results are presented.