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Tunable Size Gold Nanoparticle – Enzyme Substrate Conjugates: Possible Sensor Applications

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Nanogold cluster formation can be achieved with peptide mediated process, when specific sequence of amino acids can serve with reducing and stabilizing functionality. Depending on ratio of the gold salt and the specific peptide sequence, the size of the gold clusters as well as the aggregation tendency can be tuned.

Cluster forming peptide sequence can be combined with enzyme specific peptide fragments used in artificial enzyme substrates. The aim is to use the size dependent reporting function of gold clusters in the detection of enzymatic processes.

From subnano to 50 nm size gold nanoclusters have been prepared as peptide conjugates bearing enzyme cleavage specific structures. The size dependent photoluminescent and UV-Vis absorbance characteristics have been evaluated with spectroscopic methods, and the nanoparticle size distribution has been verified with transmission electron microscopy.

Application of nanoparticle-peptide conjugates in surface sensitive detection techniques have been considered. Different surface attachment strategies, self-assembly and chemical conjugation have been assayed to optimize distribution of surface attached structures.

Electrochemical measurements, such as cyclic voltammetry and differential pulse voltammetry were used to investigate the electrochemical activity of surface confined nanoparticle peptide conjugates, also to evaluate the application of the clusters as reporters of enzymatic cleavage of specific peptide structures.

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