

P002 Synthetic *de novo* designed polypeptides for control of nanoparticle assembly and biosensing

D. Aili¹, K. Enander¹, L. Baltzer² and B. Liedberg¹

¹*Division of Sensor Science and Molecular Physics, Department of Physics, Chemistry and Biology, Linköping University, SE-581 83 Linköping, Sweden;*

²*Division of Organic Chemistry, Department of Chemistry, BMC, Box 599, Uppsala University, SE-751 24 Uppsala, Sweden.*

This contribution describes how *de novo* designed synthetic polypeptides can be utilized to control the assembly of gold nanoparticles and as scaffolds for biosensing. The synthetic helix-loop-helix polypeptides are designed to fold into a four-helix bundle upon dimerization. A cysteine residue is introduced in the loop region to facilitate site specific and directed immobilization. The peptides are usually immobilized as monomers. Dimerization and folding occurs between peptides on neighboring particles as an effect of aggregation. The folded peptides are rigid enough to keep the particles separated at a distance corresponding to the size of the four-helix-bundle. The dimerization also can be used to assemble nanoparticles into hybrid multi-layers on planar substrates.

The drastic change in the resonance conditions of the localized nanoparticle surface plasmon upon aggregation can be utilized for optical detection of macromolecules. Binding of a target protein to a small ligand, covalently bound to the immobilized peptide scaffold, prevents aggregation of the particles, whereas aggregation occurs in the absence of target protein. The change in aggregation state is readily observed as wavelength and/or intensity shifts (the sensing signals) in the extinction spectrum.