

P017 Protease triggered peptide-functionalised gold nanoparticle assembly

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The ability to control the assembly of nano-structures under physiological-like conditions is useful for the development of bio-responsive materials. Peptides are interesting biomolecules for the directed assembly of gold nanoparticles as the availability of different amino acids allows for rational design of peptide sequences and physical properties. Proteases are particularly well-suited to trigger the assembly or dis-assembly of peptide-functionalised gold nanoparticles as proteases are (i) chemo, regio and enantioselective, (ii) work under mild conditions and (iii) are involved in disease states such as HIV, Alzheimer's disease, Hepatitis C, Candida infections and pancreatitis [1]. The optical properties of gold nanoparticles are such that the state of aggregation can be monitored by a change in colour [2]. We have successfully designed a peptide-functionalised gold nanoparticle assembly which dis-assembles upon detection of a protease, Thermolysin. The change in the state of nanoparticle assembly (supported by electron microscopy) results in a colour change from blue to red. UV-visible spectral shifts are measured after 5 min and zepto-molar (single molecule) detection has been demonstrated.

References:

[1] Maly D.J. ChemBioChem. 2002;3(1):16-37

[2] Chowdhury, M.H. J. Biomed. Opt. 2004;9(6):1347-1357