Electronic Supplementary Material (ESI) for Analyst

Supplementary Information for

Fast protein detection using absorption properties of gold nanoparticles

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Synthesis of gold nanoparticles of different sizes

Different sizes of gold nanoparticles were prepared (20nm, 40 nm and 60nm) and analysed by UV/Vis spectroscopy (Fig. S1).

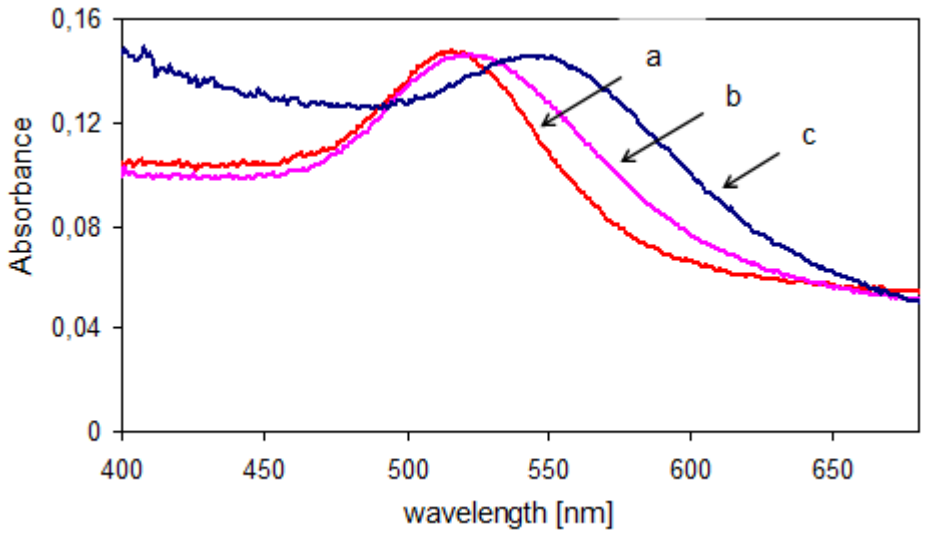

Fig. S1

Fig. S1 Absorption spectra of citrate stabilized AuNP-solutions (a) 20nm AuNPs, (b) 40nm AuNPs, (c) 60nm AuNPs.

Effect of volume ratio, pH and ionic strength of the buffer solution

The aggregation of gold nanoparticles is caused by mixing gold nanoparticles and alpha-fetoprotein in appropriate volume ratio (9:1). We have investigated how this volume ratio is influencing the quality of analysis of different protein concentrations. With a ratio of 8:1 the same results are obtained, indicating that a small variation in the mixing ratio of nanoparticles and sample can be tolerated. However smaller ratio such as 7:1 or 5:1 clearly results in a

smaller signal (both absorption and DLS). The concentration range of response remains the same, but sensitivity is decreased.

Furthermore we have analysed the effect of different pH and ionic strength (Fig. S2).

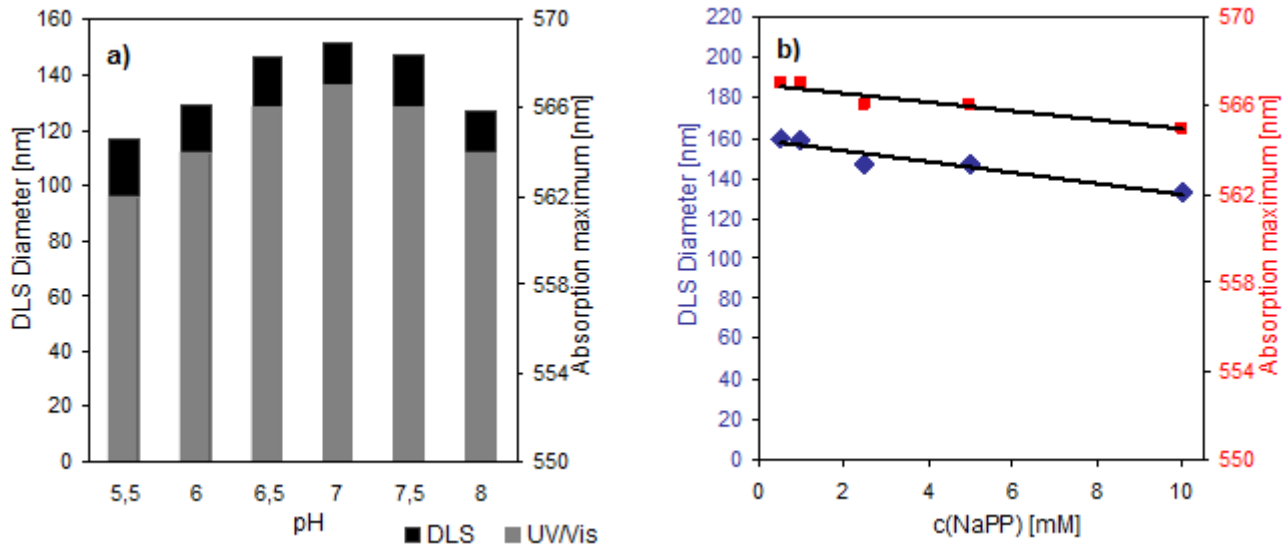

Fig. S2

Fig. S2 The pH effect (a) and the effect of ion concentration of the Au-NP solution (b) on the aggregation of antibody-functionalized gold nanoparticles (60nm) with an alpha-fetoprotein concentration of 0.3 µg/ml (concentration of particle solution: 0.08 nM in sodium phosphate buffer, pH 7; volume ratio of Au-NP:protein = 9:1).