Supplementary Material (ESI) for Analyst
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Short-wave infrared excited SERS

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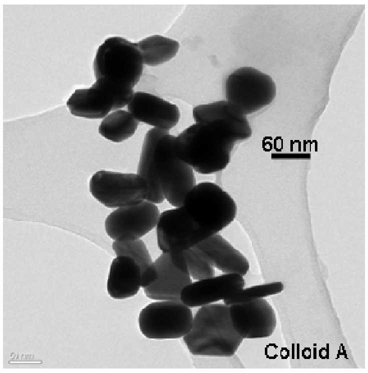
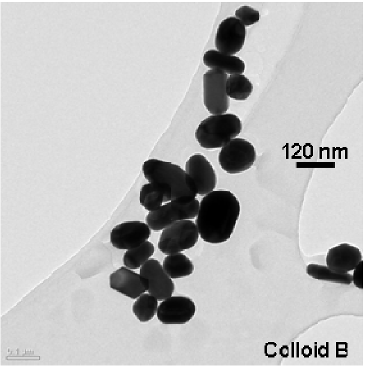
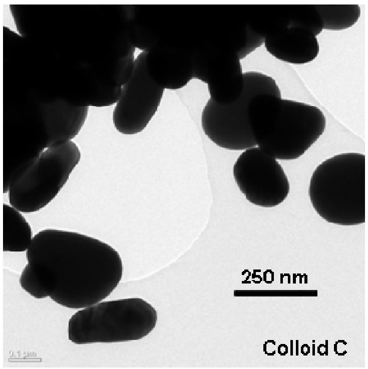
Colloidal Preparation:

Gold (III) chloride hydrate (46 mg, Sigma) was added to 200 ml H_2O and the solution brought to boiling point under constant stirring. Upon boiling, 32 mg sodium citrate (Sigma) in 1 ml deionised water was added and the solution kept boiling for a further 15 minutes. The solution was cooled to room temperature with constant stirring. The colloid synthesised in this way is referred to as colloid A. Colloid B and colloid C were synthesised similarly but using 24 mg and 18 mg of sodium citrate respectively.

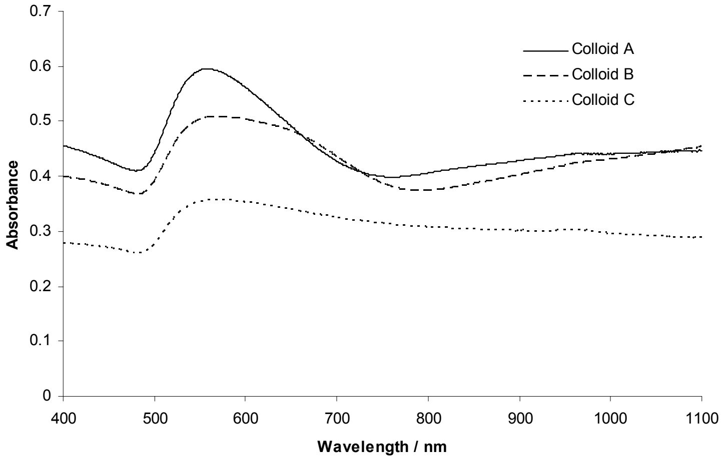
The colloids were poly-disperse with average colloidal size ~60 nm (colloid A), ~120 nm (colloid B) and ~250 nm (colloid C). Colloid A was stable for over 1 year, colloid B 6 months and colloid C, less than 1 week. Transmission electron microscopy (TEM) images were acquired on an FEI-Tecnai TEM with a LaB_6 electron source operating at 200kV.







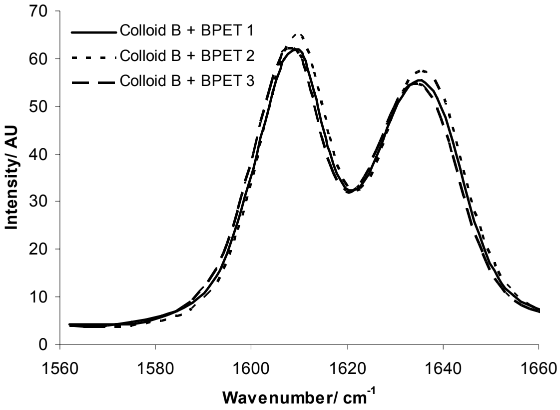
Electronic spectra were recorded up to 1100 nm using a Cary 300 UV-Visible spectrophotometer. It is observed that all three colloids have broad absorption maxima at approximately 560 nm; however colloid A reaches a second maximum around 1100nm whereas colloid B is still absorbing further in to the infra-red. Colloid C does not have any secondary absorption peaks in the range analysed.



SERS measurements:

Gold colloid (1 ml) was added to 80 µl analyte (0.1 mM) and the mixture vortexed. The addition of various aggregating agents were examined (sodium chloride, 1% Nitric Acid and spermine), however the most intense SERS signals at 1546 nm were recorded when no aggregating agent was present. 780 nm measurements were made using a Thermo Nicolet Almega Dispersive Raman spectrometer using a 10 s acquisition time with a laser power of 18 mW. 1064 nm and 1546 nm SERS measurements were made using Real Time Analyzer FT-Raman spectrometers (measurements at 1546 nm were made using an external laser source, Innovative Photonics Solutions, coupled to the spectrometer). All 1064 nm measurements were made using a 1s acquisition time with a laser power of 420 mW. All 1546 nm measurements made using a 1 s acquisition time and laser power of 200 mW.

SERS responses were found to be reproducible. An example of this is shown below with 1,2-Bis(4-pyridyl)ethylene (BPET) used as the analyte. Three separate solutions were prepared and analyzed. The peak at 1610cm^{-1} was used for comparison purposes.



Sample	Intensity of maximum peak at1610 cm^{-1} (AU)
Colloid B + BPET 1	61.8
Colloid B + BPET 2	65.0
Colloid B + BPET 3	61.8