

**S011** Functionalised nanoparticles for nucleic acid sequence analysis using optical spectroscopies

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Surface enhanced resonance Raman scattering (SERRS) is an analytical technique with several advantages over competitive techniques in terms of improved sensitivity and multiplexing. We have made great progress in the development of SERRS as a quantitative analytical method, in particular for the detection of DNA. However, the lack of quantitative data relating to real examples has prevented more widespread adoption of the technique. Due to the vibrational nature of SERRS it offers advantages over existing detection techniques in the ability to multiplex which is limited when using techniques such as fluorescence. To demonstrate this, we have identified the presence of a mixture of 6 analytes in solution using data analysis techniques. Following discussion of the basic approaches used to obtain sensitive detection of DNA by SERRS, two new approaches will be highlighted. One involving nanoparticle assemblies and the second involving an enzyme dependent signal generation approach. Both offer opportunities for closed tube assays with single base mismatch discrimination possible. Finally, the successful demonstration of molecular diagnostic assay based on SERRS for clinical use will be presented.