**Recent Approaches to the Study of Biomolecular Recognition**

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In this talk I will discuss recent developments in our laboratory in the study of recognition events between calix-arenes and various biological systems, but also with a little digression or two into results that have come out of this work but don’t involve calix-arenes. We will look at hybrid calix-arene capped silver nanoparticles, then at the use of Silicon Nano-Tweezers, work carried out at the LIMMS laboratory at IIS, University of Tokyo and finally at how we have begun to use 3D printing in biomolecular recognition studies.

With regard to the calix-arenes we have generally used the *para*-sulphonato-calix[n]arenes with an occasional use of the calix[4]arene diphosphonate, both systems efficiently cap silver nanoparticles with retention of their molecular recognition properties and the advantage of the Plasmonic properties of the nanoparticles. In this section we will look at the interactions with nucleobases and nucleosides, then at how the optical properties allow the measurement of Critical Micellar Concentrations and finally a brief view of their use as transporters of markers of amyloid aggregates.

Over the last three years we have enjoyed an effective collaboration with the LIMMS laboratory with a graduate student spending several months there each year. This work has involved the use of Silicon Nano-Tweezers to study the mechanical properties of DNA, initially it appeared that the capped nanoparticles attached and stiffened DNA bundles, but careful work showed us that the effects were due to silver cations. Continuing on from this we studied various other metal ions, known to interact with DNA, but the most interesting results concern protonation of DNA and the selective binding of silver.

My curiosity led me to wonder on the use of 3D printing in molecular recognition studies and the group has during the last year worked on device construction, the important factor here is that one the commonly used polymers PLA contains reactive ester functions which can be surface modified. The very recent appearance of a range of printable polymers has opened up a whole new of molecular recognition studies. We have designed systems for the electrical measurement of molecular recognition events, these are combined with optical measurements soon redox studies. The work shows that the surface modification has strong effects on the electrical properties our devices and does allow the study of selective biomolecular recognition events.