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Current challenges and approaches for improved localized surface plasmon resonance biosensing

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Biosensing utilizing Localized Surface Plasmon Resonance (LSPR) offers relatively inexpensive, label-free, facile detection that is amenable to on-chip devices. Such devices can provide exquisite sensitivity at a low cost and should prove extremely useful in resource limited environments. However, several challenges remain, such as: sensitivity to small molecule binding, specificity in complex biological solutions, detection of membrane-associated species and integration into on-chip devices. This presentation will highlight recent advances in LSPR-based biosensing devices developed in the Sagle group to overcome these limitations. One study we have done to increase sensitivity is an assay in which gold nanostars are aggregated upon addition of an analyte. Due to increased surface area of contact, a large decrease in K^d and limit of detection in the attomolar range was observed with this simple aggregation assay. In addressing the second challenge, we have incorporated shape complementarity on the nanoparticle surface to carry out size-selective biosensing with improved selectivity. The third challenge is tackled through the development of a novel plasmonic platform containing a solid supported lipid bilayer so that label-free measurements of membrane associated species can be carried out. This device is shown to have improved sensitivity over existing platforms. Lastly, large-scale patterning of the nanoparticle arrays enabling the interfacing of these arrays with microfluidic on-chip devices are also presented.

Biography

Laura Sagle has completed her PhD in 2006 from University of California San Diego under the direction of Prof. Floyd Romesberg at the Scripps Research Institute. She then carried out Post-doctoral research in the laboratory of Prof. Paul Cremer followed by another Post-doc in the lab of Prof. Richard Van Duyne. The Sagle group currently carries out research at the biology-nanoscience interface, focused on improved LSPR biosensing and single molecule biophysical surface enhanced Raman spectroscopy.

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