

Electrokinetic Preconcentration on Oil/Water Interface for Sensitive Optical Sensing

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For sensitive optical detection, there has been extensive research on how to design a metallic nanostructure to maximize signal enhancement. On the other hand, the preconcentration of molecules to be detected can be a good alternative to significantly amplify a signal. Here we demonstrate that the remarkable preconcentration of molecules at an oil/water interface can be realized by exploiting electrostatic force between the molecules and the surface of an ionizable oil. As a proof-of-concept, surface-enhanced Raman spectroscopy (SERS) was applied to estimate the extent of the preconcentration at the interface. We observed that rhodamine 6G (R6G) can be concentrated at the interface more than 100 times and 1 nM of R6G is readily detectable without any external forces and additional chemicals. We believe that our simple preconcentration method can be extended to the detection of biologically or environmentally important molecules.