

On-site Plasmonic Detection of Metabolites and Gas for In-situ Monitoring of Biological Gas Conversion

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Real-time monitoring of small molecules that include metabolites and dissolved gas is very important in biological gas conversion. For example, indirect estimation of the concentration of dissolved gas from a partial pressure using chromatographic analysis (e.g., gas or liquid chromatography) has been widely used to optimize biological gas conversion. However, this method is based on the assumption that a bioreactor is in an equilibrium state and, therefore, suffers from poor reliability since the bioreactor is far from the equilibrium due to bacterial metabolism and mechanical agitation. Furthermore, the bioreactor is often contaminated during off-line sampling. In this talk, I briefly introduce on-site plasmonic detection of dissolved small molecules based on surface-enhanced Raman spectroscopy (SERS) by using inverse transfer that we have recently proposed. First, colloidal nanoparticles are self-assembled at air/water interface and, then, transferred onto transparent polymeric substrates by the inverse transfer.