Anomalous reflection of gold: a novel platform for biochips

ABSTRACT

The importance of protein detection system for protein functions analyses in recent post-genomic era is rising with the emergence of label-free protein detection methods. We are focusing on a simple and practical label-free optical-detection method called anomalous reflection (AR) of gold. When a molecular layer forms on the gold surface, significant reduction in reflectivity can be observed at wavelengths of 400–500 nm. This allows the detection of molecular interactions by monitoring changes in reflectivity. In this chapter, we describe the AR method with three different application platforms: (1) gold, (2) gold containing alloy/composite (AuAg2O), and (3) metal-insulator-metal (MIM) thin layers. The AuAg2O composite and MIM are implemented as important concepts for signal enhancement process for the AR technique. Moreover, the observed molecular adsorption and activity is aided by a three-dimensional surface geometry, performed using poly(amidoamine) or PAMAM dendrimer modification. The described system is suitable to be used as a platform for high-throughput detection system in a chip format.