Preparation of Metal Nanoarrays with Tunable Localized Surface Plasmon Resonances for Ultrasensitive Biochemical Sensors

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Molecular detection using Localized Surface Plasmon Resonances(LSPR) has been widely investigated because this technique enables label-free molecular detection. The high-density metal nanoarrays with tunable LSPR characteristics have been used as ultrasensitive molecular sensing platform. Colloidal lithography is a robust method for fabricating regularly ordered nanostructures in a controlled and reproducible way using spontaneous assembly of colloidal particles. In this study, nanoarrays on polymer thin film with different shapes and spacings were fabricated via colloidal lithography. Then, metallic nanostructures with high density were created by sputtering noble metals such as gold (Au) and etching of residual polymers and colloidal particles. LSPR characteristics of metal nanostructures could be tuned by varying the materials and conditions for fabrication to find optimal structures for LSPR sensing. Finally, LSPR sensor substrates which were fabricated by colloidal lithography were used to achieve real-time label-free monitoring of biomolecules.