

Molecular Recognition of Biomolecules versus Nanostructures: Design, Synthesis, Characterization and Applications

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Abstract:

The objective of our research is to develop a simple detecting scheme for glycoproteins. We designed and prepared a self-assembled gold nanoparticle monolayer (GNP-SAM) on the glass substrate followed by incorporation of sugar-derivatized thiol to the nanoparticles. By utilization of highly sensitive surface plasma resonance originated from gold nanoparticles as the signal readout unit and sugars as the recognition unit, the chemosensor for glycoproteins can be produced. In the presence of targeted glycoproteins, the change in surface plasma resonance intensity can be used to evaluate the molecular recognition event. We have successfully developed Man-, Gal-, and GluNac-derivatized chemosensors for sensing glycoproteins with high specificity. In addition, to evaluate the possibility of using the same scheme to develop sugar-derivatized microarray, the self-assembled gold nanoparticles were used as a platform to pattern two different sugars (mannose and galactose) for lectin sensing. Our preliminary studies showed that high substrate specificity and detectable signals can be achieved by using this two-unit array for sensing two different lectins. Moreover, no cross-talk phenomenon was observed.



