Site-Directed Antibody Immobilization by Resorc[4]arene-Based Immunosensors

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One of the main problems in the development of immunosensors is to overcome the complexity of binding antibodies to the sensor surface. Most immobilizing methods lead to a random orientation of antibodies with a lower binding site density and immunoaffinity. In order to control the orientation of antibody immobilization, several resorc[4]arene derivatives were designed and synthesized. After the spectroscopic characterization of resorc[4]arene self-assembled monolayers (SAMs) onto gold films, the surface coverage and the orientation of insulin antibody (Ab-Ins) were assessed by a surface plasmon resonance (SPR) technique and compared with a random immobilization method. Experimental results combined with theoretical studies con- firmed the dipole–dipole interaction as an important factor in antibody orientation and demonstrated the importance of the upper rim functionalization of resorcarenes. Accordingly, resorcarene 5 showed a major binding force towards Ab-Ins thanks to the H-bond interactions with the amine protein groups. Based on these findings, the resorcarene-based immunosensor is a powerful system with improved sensitivity providing new insight into sensor development.

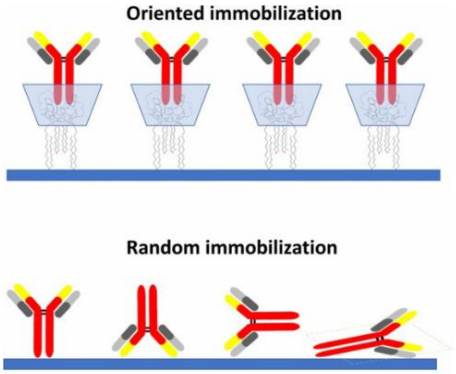

Figure 1. Oriented and random antibodyimmobilization on solid surface.