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THALIDOMIDE IMPRINTED NANOPARTICLES ON THE THIN-FILM LAYERS OF INTERDIGITATED CAPACITIVE ELECTRODE FOR SENSOR APPLICATIONS

In this study, we describe the development of thalidomide sensor for detection of the chiral drug enantiomers at low concentration in the buffer and whole blood sample based on microcontact imprinting, molecularly imprinted polymer nanoparticles (MIP) as a stamp in a film of non-conducting polymer using interdigitated capacitance electrode (IDC) and surface-enhanced Raman scattering (SERS). The characterization of the obtained MIPs with film cast and topography as well as surface properties (height, roughness, chemical function, thermodynamic) properties were studied by atomic force microscopy (AFM) and Raman-AFM image and spectra. The results revealed that the interaction between particle-particle, drug-particle and enantiomer-MIP at a molecular level. AFM image and force curve analysis provided the differences of force surface adhesion from (R)-enantiomer imprint in film-cast much higher than (S)-enantiomer MIP indicating drug-binding interaction can be used to detect enantiomers and distinguished between the two enantiomers. In addition, the thickness of AFM and surface protein matrix at dry state was different between this two MIPs. The different arrangement of the surface capture on IDC was prepared with respect to electromagnetic field lines depend on the two different functional groups cause a significant different resistance response to the analyte in buffered solution and blood compared to the control. The MIP interdigitated capacitance measurement helped to clarify the surface enhanced Raman scattering (SERS) results from the effected of both layer and the combination effect between biomolecules and polymers. Taken together with the Raman-map and IDC study revealed differentiation of exposed partially buried residues by the reactivities of drug-particle interaction with accessible surface area. The important characteristics of the small distance of thin-layer increased with the added layer of biomatrix affect the interaction between active sensor and MIP cause in the low concentration of thalidomide enantiomers induced the increase of resistance signal and/or charge transfer between enantiomers in MIPs layer and matrix.

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