Chiral Recognition of Mandelic Acid on Quartz Crystal Microbalance by Vapor Diffused Molecular Assembly Method

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Chiral recognition plays important roles in pharmaceutical and biotechnology fields. The key step for selectively sensing chiral compounds is to build a chiral surface with recognition sites to enantiomers. In this study we report a new approach for highly selective recognition of chiral L- / D-mandelic acid (MA) by quartz crystal microbalance (QCM), using L-phenylalanine (L-Phe) as the selector. The immobilization of L-Phe on the gold surface of QCM electrode was performed by using a four steps layer-by-layer assembling procedure. The modification of the gold surface of the QCM sensor after each modification step was verified by cyclic voltammetry, contact angle, FTIR, and QCM detection. The chiral recognition ability of L- / D-MA on this chiral surface was checked by sensing them using vapor diffused molecular assembly method by QCM. The chiral discrimination factor between L- and D-MA, α L-MA/D-MA, was found to be about 9. The high chiral discrimination ability of the modified surface could be the result of the different hydrogen binding force between L- or D-MA and L-Phe.