

Selective Recognition of R/S-mandelic acid by S-MA Derivative-Modified QCM Sensor

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This study presents a new approach for the highly selective molecular recognition of chiral R/S-mandelic acid (MA) using an S-MA derivative with an optically active hydroxyl group as selector. The construction of S-MA derivative modified QCM sensor involved a three-step layer-by-layer assembly procedure. Each modification step was analyzed by cyclic voltammetry, the contact angle, and a resonance frequency measurement. The chiral recognizability of the S-MA derivative modified QCM sensor to R/S-MA was then examined by resonance frequency measurement and also investigated by atomic force microscope (AFM) measurements. A chiral discrimination factor of up to 5.4 between R- and S-MA on the S-MA derivative modified QCM sensor was obtained in aqueous solution reaction. AFM results also showed obvious selective aggregation of S-MA on the S-MA derivative modified surface but no noticeable aggregation of R-MA during the liquid phase reaction. Both of the QCM and AFM results confirmed the usefulness of this proposed liquid technique for the study of chiral recognition. The main advantage of the proposed method is that it is based on an on-time technique and required a short detection time of about 9 hours.