Enantiorecognition of Chiral Drugs by Molecularly Imprinted Electrochemical Sensor

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Nowadays the significance of developing analytical methods and sensors for enantioseparation is well recognized in chemical and pharmaceutical industries. Several methods, including electrochemical and optical sensors, high performances liquid chromatography, capillary electrochromatography, capillary electrophoresis, and supercritical fluid chromatography have been used for this purpose. In recent years, the process of developing and applying novel molecular imprinted polymers (MIP) in the field of chiral separation is extensively explained in the literature [1,2]. Omeprazole (OMP) is a racemic drug with both enantiomers entering the parietal cells where, in the presence of an acid, they are converted to an achiral sulphonamide that, in turn, inhibits the proton pumps therein. The pharmacological effects of omeprazole are, therefore, not stereoselective.
In this work, a novel molecularly imprinted polymer (MIP) electrochemical sensor was developed for the detection of the omeprazole enantiomers. The sensor was prepared using □-cyclodextrin, tetraethyl orthosilicate and cetyltrimethylammonium bromide in the presence of ammonium hydroxide on the glassy carbon electrode. Cyclic voltammetry and differential pulse voltammetry were applied to follow the changes in the MIP-layer related to rebinding and removal of the target omeprazole enantiomers by using the redox marker $[Fe(CN)_6]^{3-/4-}$. The results of selectivity tests of the molecularly imprinted polymer (MIP) showed a high specificity towards OMP enantiomers compared to other similar molecules. Furthermore, the developed sensor was successfully applied to detect OMP enantiomers in tablets and biological samples with a good recovery percentage.

References

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