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Ultra-trace analysis of D-and L-aspartic acid applying one-by-one approach on a dual imprinted electrochemical sensor

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An enantiomeric pair imprinted polymeric film, with embedded functionalized multi-walled carbon nanotubes, was developed following the surface grafting from approach onto a gold nanoparticles decorated pencil graphite electrode. Double imprinting of chiral molecules in a single polymer motif, as a sensory platform, for the one-by-one evaluation of individual components of a racemic mixture, is a challenging task. The underlying state-of-art proposed for this purpose is novel and if this works well, any two simple molecules could be used as templates. In this work, a pencil graphite electrode was first dipped for the overnight in the aqueous suspension of gold nanoparticles. The electrode was then subjected to spin coating with a pre-polymerization mixture consisting a monomer (N-acryloyl-pyrrolidine-2,5-dione), templates (D- and L-aspartic acid), a cross-linker (ethylene glycol dimethacrylate) in the presence of an initiator (α,α'-azoisobutyronitrile). As aspartic acid isomers have been found to be electro-inactive, their evaluation was feasible indirectly with the help of a potassium ferricyanide probe. The quantitation ability of the proposed sensor, with differential pulse anodic stripping voltammetric transduction was found to be in the tune of 4.08 ngmL^{-1} (S/N=3) for both the enantiomers in the real samples, which reportedly manifest several chronic diseases at their stringent limits.

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