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Composites of Multiwalled Carbon Nanotubes and Molecularly Imprinted Polymers for Enantioselective Recognition of D-Mandelic Acid

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Abstract — A novel chiral sorbent for D-mandelic acid (D-MA) has been fabricated on vinyl functionalized multiwalled carbon nanotube (MWCNT) by molecular imprinting technology. Molecular imprinted polymers (MIPs) were formed by D-MA as a template molecule on the surface of the vinyl functionalized MWCNT with 4-vinyl pyridine (functional monomer) and ethylene glycol dimethacrylate (crosslinking agent) with a thermal polymerization technique. FT-IR, X-ray diffraction technique (XRD) and transmission electron microscopy (TEM) were used to characterize the composite structure, morphology and determine the grafted MIP quantities in the composite. Properties like adsorption dynamics, specific binding and selective recognition capacity were evaluated. The resulting MWCNT-MIP demonstrated favorable selectivity, good stability and a higher adsorption capacity for the template molecule compared to products created by bulk polymerization. For comparison, blank polymer (MWCNT-NIP) was prepared by the same procedure, only without using the template molecule in the polymerization process. To get an insight into the role of MWCNT on chiral recognition, D-MA imprinted and non-imprinted polymers without MWCNT were also prepared.

Keywords : *Chiral recognition, D-mandelic acid, molecular imprinting, multiwalled carbon nanotube.*

INTRODUCTION

Chirality is an important universal phenomenon in nature. For the in-depth study of pharmacology and biology, efficient enantioselective technologies are essential [1].

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