Chiral Recognition by Materials with Multi-Scale Chirality

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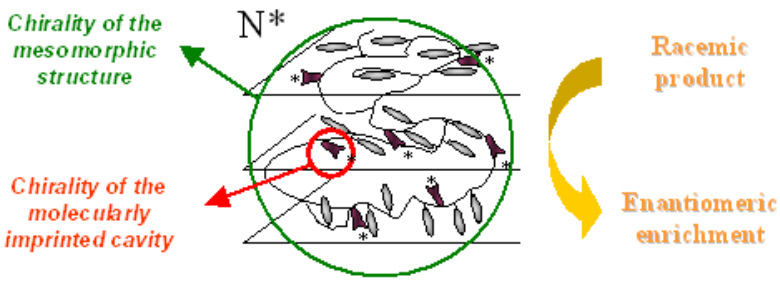
Design and synthesis of chiral macro- and supramolecules has promoted great interest in their relationship with biological phenomena and in their potential applications in materials science, for instance as optically active materials, catalysts, adsorbents or chiral selectors for enantiomeric separation.[1] In most of the materials used for separation, chiral discrimination originates from asymmetric affinity on a molecular scale. The materials can be obtained either by grafting chiral molecules onto an achiral substrate or, in order to improve specificity, by forming chiral cavities around a pure enantiomer to synthesize so-called molecularly imprinted polymers.[2] Other materials have taken advantage of chiral interactions at a supramolecular scale. Hence cholesteric networks with a chiral structure but without molecular chirality are able to discriminate between two enantiomers.[3] This separation is greatly improved by adding functional groups interacting with chiral molecules.[4] To combine the previous approaches, a cholesteric imprinted network was synthesized, around a chiral template using acid groups as functional moieties. The network thus exhibits two levels of chirality i.e. local chirality from the micro-cavities formed by the imprinted sites and macroscopic chirality due to the cholesteric structure. The kinetics of sorption of the two enantiomers by the template was investigated by the use of an electronic microbalance in order to analyse the specific role of each level of chirality.[5]



(1) J.W. Goodby, I.M. Saez, S.J. Cowling, V. Gortz, M. Draper, A.W. Hall, S. Sia, G. Cosquer, S.E. Lee, E.P. Raynes, *Angew. Chem. Int. Ed.* **2008**, *47*, 2754-2787.
(2) J.-D. Marty, M. Mauzac, *Adv. Polym. Sci., 'Microlithography/Molecular Imprinting'* ISBN 3-540-21862-9, **2005**, *172*, 1-35.
(3) G. Palaprat, J.-D. Marty, D. Langevin, H. Finkelmann, M. Mauzac, *J. Phys. Chem. B* **2007,** *111*, 9239-9243.
(4) G. Palaprat, A.-F. Mingotaud, D. Langevin, J.-D. Marty, M. Mauzac, *J. Phys. Chem. B* **2008,** *112*, 6603-6608.
(5) G. Palaprat, A.-F. Mingotaud, D. Langevin, J.-D. Marty, M. Mauzac, *submitted*