

Molecularly imprinted polymers

The technique of “molecular imprinting” is developing and refining at an exponential rate. Imprints of individual molecules can be formed in plastics to yield molecularly imprinted polymers (MIPs), thereby opening up a whole range of new opportunities for application. Availability of MIPs will revolutionize many important aspects of drug discovery, medical diagnostics and environmental pollutant detection.

Molecular imprinting is a technique for the preparation of polymers carrying selective recognition sites for different compounds. This technique has been used for the preparation of chiral stationary phases for chromatography, with ability to separate efficiently the enantiomeric forms of peptides and drugs. Molecular imprinting progress is leading to commercial applications of solid phase extraction, chromatography-type applications that are now in the market. Although the applications of MIPs look promising, their preparation is not easy. One major difficulty is optimizing the composition of MIPs. A molecule possesses various handles of different shapes and sizes and it is necessary to find the polymer components or monomers with complementary attachments to optimize the imprinting process. Choosing the right monomer is important. Scientists at Cranfield University, the United Kingdom, have developed a molecular modelling computer package that runs through large combinations of monomers to choose the ideal one.

Scientists are working on molecularly imprinted drug discovery systems wherein the imprinted polymer is used as biological receptor mimic. These materials can be used to identify, from a complex mixture or individual samples, potential drug candidates on the basis of their affinity for molecularly imprinted receptor mimic. Some scientists are particularly interested in compounds that may be active against certain types of cancers. Potential applications of MIPs will also include diagnostic medical sensors for use in urinary and transcutaneous monitoring. These polymers have also been employed for the quantification of drugs in blood samples using competitive binding assays. (BSS Newsletter, September 2001)