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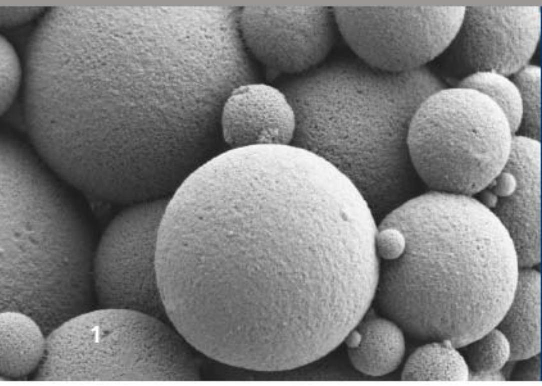

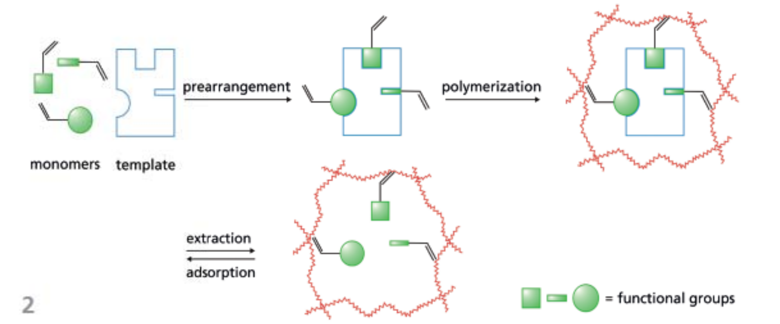

1 *SEM image of porous MIP particles.*

2 *Outline of MIP synthesis.*

MOLECULARLY IMPRINTED POLYMERS (MIPs)

FUNCTIONAL POLYMERS GENERATED BY MOLECULAR IMPRINTING

Background

The term "molecular polymer imprinting" describes a highly elegant and efficient method of producing functional materials equipped with selective identification characteristics. Molecularly imprinted polymers (MIPs) are produced by synthesizing highly cross-linked polymers in the presence of template molecules. In a self-organizing process, the growing polymer skeleton adapts to the molecular model, forming a type of imprint of the molecular template.

After polymerization, the template is removed by evaporation, decomposition or washing. The cavities remaining in the polymer material are dimensionally stable due to the high degree of cross-linking. This geometrical adaptation and the interactions between functional groups (for example the formation of hydrogen bridges) make the polymers selective for the template molecule and therefore suitable for its identification or enrichment.

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3 *Coating of QCMs.*

4 *Measurement of SAW sensors.*

Technology of molecular imprinting

For polymerization purposes a wide range of low-cost functional monomers (various acrylates and styrenes) as well as cross-linking agents are available, and can be selected to match the functional groups of the template molecule. The portfolio of optional templates ranges from natural substances (such as steroids) and toxic substances (herbicides and pesticides) to explosives (e.g. TNT).

Meanwhile, block or suspension polymerization (in the case of enrichment materials) or layer-by-layer polymerization (for sensor applications such as QCM, SAW, FET), are available to adjust the material properties to suit the application. Due to cross-linking, the polymers are highly resistant to mechanical and chemical stresses, and consequently remain functional for long periods of time. MIPs can be used in all known sensor types.

Examples of applications

- Chromatography (HPLC, GC): separation of enantiomer mixtures
- Solid phase extraction (SPE): isolation of natural substances
- Chemical sensor systems (optical, electrochemical, mass-sensitive, etc.): detection of hazardous substances
- Catalysis: enzyme reaction, reduction of enantiomers

Service portfolio

- MIP synthesis with different monomers and templates, for enrichment/extraction or as selective sensor coatings
- Characterization of surface properties and particle size distributions
- Characterization of the adsorption properties of the template