PREPARATION OF WATER-COMPATIBLE MOLECULARLY IMPRINTED POLYMER MICRO- OR NANOPARTICLES FOR BIOANALYTICAL APPLICATIONS

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ABSTRACT

Molecularly imprinted polymers (MIPs) are tailor-made synthetic receptors with high affinity and selectivity toward the targeted analytes.[1] They have proven to be promising substitutes for biological receptors owing to their good molecular recognition ability, high stability, easy preparation, and low cost and have shown great potential in many applications such as separation and purification, antibody mimics (immunoassay or biomedicine), chemical sensors, biomimetic catalysis, drug development, and drug delivery. Despite tremendous progress made in the field of molecular imprinting, some significant challenges still remain to be addressed prior to the broad routine applications of MIPs. One of the main challenges is to develop MIPs that can show specific molecular recognition ability toward small organic analytes in aqueous samples (i.e., water-compatible MIPs) because food safety control, environmental monitoring, clinical diagnostics, and drug delivery are typically based on aqueous systems.

Over the past few years, our group has successfully established some facile, general, and efficient approaches for the synthesis of hydrophilic MIP particles that are capable of specifically recognizing small organic analytes in aqueous solutions (in particular in real, undiluted biological samples such as various undiluted pure milks and serums) on the basis of the controlled/"living" radical precipitation polymerization techniques.[2-6] Very recently, we have extended our research into the development of advanced functional hydrophilic MIP micro- or nanoparticles for controlled drug release, direct and sensitive optosensing of drugs in complex biological milieu, and rapid separation of target analytes from complex samples.[7-9] We will introduce some of our recent progress in such areas in this presentation.

References

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