Molecular Imprinted Polymers (MIPs) are biomimetic nanostructures that can be used in a number of applications including genetics, artificial enzymes, drug delivery systems and biochemical sensors. An MIP is based on the molecular recognition, a process incorporated ubiquitously into biological systems to aid in functions such as enzymatic catalysis, antigen and antibody recognition, and DNA/RNA replication and hybridization. MIPs are patterned organic polymers designed to attach or interact with cells on a molecular level.

MIPs are typically manufactured in a three-step process. In the first step, monomers are chosen based on how they will interact with a template molecule. These monomers are then polymerized or plasticized in the presence of template molecules. The final step involves removing the template molecules, leaving behind an MIP that has binding sites specific to that of the template molecule. The template molecules are identical to those the MIPs are meant to bind with, allowing these nanoengineered molecules to be used for targeted drug delivery, sensing, and other applications.
The development of molecular imprinting technology allows for the production of cheap and infinitely tailored synthetic nanoparticles, nanofilms, and nanowires that can be used in various scientific and healthcare applications. MIPs can be found extensively in the marketplace, and new variations of MIPs and the molecular imprinting process are currently being used or under development.

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Author:

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Development Stage:

- Ubiquitous [11]

Key Words:

- Bioengineering [12]
- Molecular Imprinted Polymers [2]
- Molecular Recognition [6]
- Biomimetic Nanopolymers [13]
- Drug Delivery [4]

Mechanism:

- Molecular Nanosystems [14]

Summary:

This novel technology is designed to mimic and manipulate the molecular recognition function of biological systems.

Function:

- Mimic Organic Molecules [15]
Benefit Summary:

This technology has applications in drug delivery, biological sensing & monitoring and genetic research, offering potential benefits in health, environmental safety, and identification and monitoring.

Benefit:

- Health
- Environmental Quality
- Monitoring

Risk Summary:

Unknown

Risk Characterization:

- Uncertain

Facility:
Activity:

- Targeted Drug Delivery
- Sensing

Substitute:

- New Application

Challenge Area:

- Health

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