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Editorial

Molecularly Imprinted Polymers (MIPs)

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MIPs, which stand for molecularly imprinted polymers, are biomimetic materials that have attracted much interest in various sectors, including healthcare. Antibodies and receptors are examples of physiologic recognition units that can be imitated by MIPs, which provides a fruitful platform for applications in biomedicine. The high specificity and selectivity of these molecules, along with their stability under critical conditions, long shelf life, and economic efficiency compared to commonly employed molecules, such as antibodies, proteins, and aptamers, are some of the attractive benefits they possess [1]. There is the possibility of preparing MIPs for targets with no existing recognising molecules. However, their use in other research areas, such as biosensors, nanocarriers, and drug delivery systems, diagnostic and imaging, has also been substantial. MIPs have been employed for a variety of applications, the majority of which have been in the extraction and separation procedures. It is impossible to make these advancements without first generating novel polymers and monomers that can be successfully employed in MIP synthesis and can also improve the variety of applications for these compounds [2]. A quick summary of MIPs is discussed, which interests the current editorial.

MIPs, synthetic equivalents to the natural, biological antibody-antigen complexes, are the most accurate way to explain them. That being the case, they function through a mechanism known as "lock and key" to selectively attach the molecule they were templated with throughout the creation process. MIPS has the potential to give specificity and selectivity to biological receptors, in addition to the apparent benefits of being durable in environmental conditions and having a low cost. Natural receptors, for instance, typically require storage and application at temperatures that fall within the human body temperature range. On the other hand, MIPs, which are based on a polymer host, can typically be stored indefinitely, do not require any special environmental storage conditions, and can be applied over a much wider temperature range [2].

Synthesis [3-5], Phase Inversion [6], and Soft Lithography [7-9] are just few of the available production methods; nonetheless, all of these procedures adhere to the same fundamental outline [10-12]. In the first step, a polymer is produced that contains the template or target molecule bound, either covalently or noncovalently, to a functional group of the host. In the second step, the template molecule is removed from the polymer host, leaving a target-specific cavity available for rebinding. In the third step, the MIP is exposed to the target-containing sample, and the cavity selectively uptakes the target molecule from a complex sample.

Another advantage of synthetic receptors is that they are nearly ubiquitous, particularly in relatively small substances. On the other hand, in biological systems, the target must match an existing antibody or be generated primarily for that target. MIPs, on the other hand, may be produced for virtually any target molecule. In addition, the production of antibodies is simpler when they are directed towards macromolecules as opposed to smaller molecular targets. Cost is an additional consideration; in general, MIPs are affordable in comparison to the expenses of natural antibodies. It is possible to create a valuable device for monitoring the environment or screening for abnormalities by coupling the MIPs to a sensing "reporter" system. A collection of scientific publications has been provided, demonstrating that research in MIP chemistry is becoming increasingly diverse, which will finally result in the enhancement of the desired features and the development of new possible uses for these materials. When attempting to synthesise a suitable MIP for selective purposes, choosing the template,

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monomer(s), crosslinker, and solvent (porogen) is essential. Each variable significantly impacts the overall performance of an MIP, including its affinity, selectivity, loading capacity, and other characteristics. Their appropriate selection ensures, to a greater extent, that MIPS with the specific qualities required for a particular application are produced at the proper level.

MIPs have applications in various scientific fields, which is only one example. Given the extensive spectrum of scientific knowledge participating in creating MIP, there is reason to be optimistic about the future of research. Given the amount of intellectual capital that has been applied, it is reasonable to anticipate that significant progress will still be made. It is necessary to undertake additional research to acquire materials capable of living up to the moniker of artificial antibodies, despite the significant progress achieved in the development of MIP.

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