**Imprinted nanogels as biomimetic catalysts**

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The term ‘biomimetic’ is commonly used to describe instances in which a chemical process imitates a biochemical reaction and has attracted considerable interest as more and more scientists study Nature’s phenomena and mechanisms. The design and synthesis of catalytic systems capable of mimicking enzyme’s activity while overcoming some of the protein’s inherent limitations is an important challenge that has been investigated using a variety of approaches including catalytic antibodies and imprinted polymers with interesting results.

Molecular imprinting is a process where a target molecule (or a derivative thereof) acts as the template around which interacting and cross-linking monomers are arranged and copolymerised to form a cast-like shell. Initially, the monomers form a complex with the template through covalent or non-covalent interactions. After polymerisation and removal of the template, binding sites complementary to the target are held in place by the cross-linked structure. A molecular memory is imprinted on the polymer, which is capable of selectively recognizing and rebinding the target. One of the interesting features of the MIP approach is the possibility to place one or more catalytically active groups at predetermined positions within the imprinted binding sites by using specifically designed monomers during the polymer synthesis.

Our earliest work has focused on the development of imprinted microgels with catalytic activity in hydrolytic reactions. More recently we reported the first example of imprinted nanogels with Aldolase type I activity and further work has been carried out to evaluate how the polymeric matrix impacts the product selectivity. Imprinted nanogels with catalytic activity in the Kemp elimination have been reported, where the significance of hydrogen bond interactions between template and functional monomers are evaluated and the impact of surfactants on catalytic activity is evaluated.

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