Applying Concepts from Nature to design the Next Generation of Synthetic Catalysts

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Catalysts are employed in some 90% of industrial chemical processes, giving us the medicine, fuel, and plastics that we have around us. And yet, synthetic catalysts do not come close to competing with the efficiency of nature’s enzymes. This is because nature’s enzymes utilise a property called cooperativity, where several catalytic groups work together in close proximity to produce astonishing accelerations in reaction rate.

In this talk, I will discuss how cooperativity can be achieved in synthetic systems to produce more efficient catalysts than what is available to us today.¹ This has implications on greener chemical processes and a more sustainable economy. I will discuss also how catalytic activity can be modulated² and even switched on and off using external triggers such as the application of light or an electrical potential.³ Advancement in this area will lead to the next generation of smart catalysts and intelligent materials.