Supramolecular Regulation Of Click Chemistry

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Controlling (bio-)catalytic activity is a fundamental concept in nature, at the basis of biochemical process regulation and signal response in living entities. These systems use enzymes that can change their activity in response to internal and external stimuli. Using these principles, we can create responsive synthetic materials. An interesting approach there is to use host guest chemistry to control the activity of synthetic catalysts, allowing control over activity by external chemical stimuli. We have designed a copper carbene catalyst which catalyses ‘click’ chemistry in biological settings, and is capable of binding to cucurbituril 7 (CB[7]). Upon binding to CB[7] we have found that the catalytic activity of the copper catalyst completely stops. After the addition of a super guest (a molecule binding significantly stronger to CB[7] than the copper catalyst) the catalytic activity will restore. This switchable catalysis system can be used to change on demand material properties, induce self-healing or can be incorporated in a signalling cascade.

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