Photoactivating C-H bonds inside Artificial Photoenzymes

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Enzymes are proteins that catalyze non-spontaneous organic reactions in physiological conditions. Remarkably the water-insoluble organic substrates are usually encapsulated in hydrophobic protein cavities, which constitute reaction hotspots in enzymes. We have devised a new catalytic paradigm using water-soluble cationic nanocages that mimic the enzyme cavity while providing a modular host-guest photoactivation strategy. [1] Through the potent combination of light activation and substrate pre-organization in water, we demonstrate facile yet selective aerobic oxidation of hydrocarbon C-H bonds under ambient conditions.[2] The success of our designed artificial photoenzyme hints at the crucial role of electric fields in driving reactions within nanospaces.

References

1. R. Gera, A. Das, A. Jha and J. Dasgupta*; *J. Am. Chem. Soc.* **2014**, *136*, 15909.
2. A. Das, I. Mandal, R. Venkatramani, J. Dasgupta*; *submitted*