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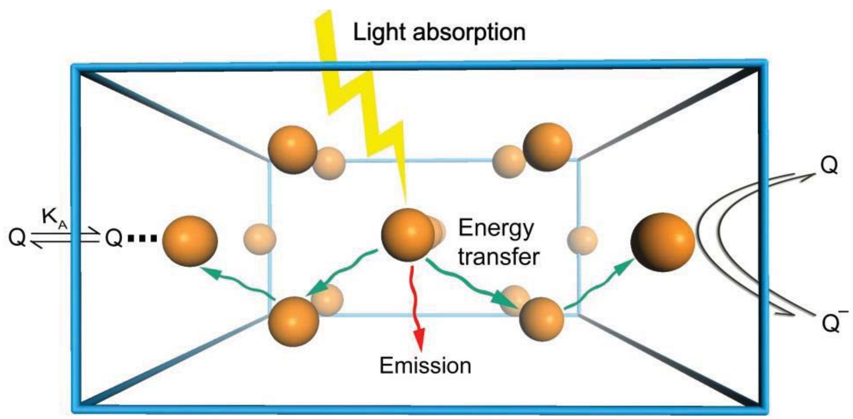
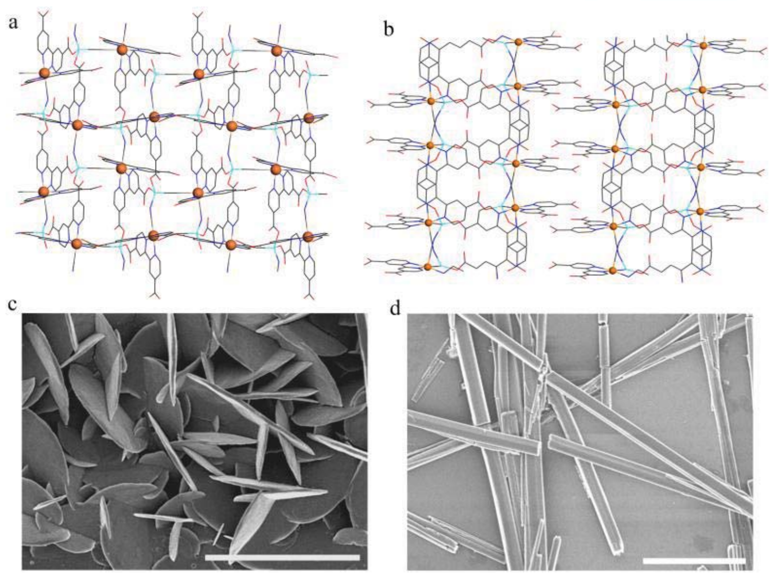
Light-Harvesting in Microscale Metal-Organic Frameworks

Caleb A. Kent, Thomas J. Meyer, Wenbin Lin, UNC Chemistry





Achievement: Microscale metal-organic frameworks (MOFs) were synthesized from photoactive Ru(II)-bpy building blocks with characteristically strong visible light absorption and long-lived triplet excited states. These MOFs undergo facile intra-framework excited state transport as determined by emission quenching by Os complexes in the Os-doped MOFs and efficient interfacial electron transfer quenching by either oxidative or reductive quenchers. Remarkably, up to 98% steady-state emission redox quenching was observed.

Significance: In photosynthesis, multiple layers of protein bound pigment complexes absorb light and funnel the excited state to a reaction center to drive productive reactions. The photoactive MOFs, with dimensions large enough to absorb the majority of light, act as excellent light-harvesters by combining intra-framework energy migration and interfacial electron transfer which can deliver this energy to redox substrates to drive photocatalysis. These well-ordered structures provide a scaffold to study both energy and electron transfer with high precision and have a potential in heterogeneous photocatalysis and artificial photosynthesis.

Kent, C. A.; Mehl, B. P.; Ma, L.; Papanikolas, J. M.; Meyer, T. J.; Lin, W. *J. Am. Chem. Soc.* **2010***, 132*, 12767.
Kent, C. A.; Liu, D.; Ma, L.; Papanikolas, J. M.; Meyer, T. J.; Lin, W. *Nature Chemistry*, in preparation.

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