

**Seeking Novel Reactivity and High Selectivity in Modern Organic  
Synthesis:  
Studies of the pH-Neutral, Cu-Catalyzed Formation of Carbon-  
Carbon and Carbon-Heteroatom Bonds and  
their Application to Biomedically Relevant Synthesis**

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Achieving high chemoselectivity in functionally complex systems under mild reaction conditions is a significant 21<sup>st</sup> century challenge for synthetic scientists. In contrast to biological processes, where exquisite selectivity is achieved *in vivo* in functionally very complex systems through the fine-tuning of protein structure to function, achieving high chemoselectivity on functionally complex molecules in *non-enzymatic* systems *in vitro* requires alternative strategies of control. This lecture will describe new control strategies that have led to the development of novel synthetic methods for pH-neutral carbon-carbon and carbon-heteroatom bond formation from nominally unreactive bond types.