Amping Up Organic Synthesis with Electrochemistry

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**Abstract:** Owing to its many distinct characteristics, electrochemistry represents an attractive approach to discovering new reactions and meeting the prevailing trends in organic synthesis. In particular, electrocatalysis—a process that integrates electrochemistry and small-molecule catalysis—has the potential to substantially improve the scope of synthetic electrochemistry and provide a wide range of useful transformations. In the past few years, we developed a new catalytic approach that combines electrochemistry and redox-metal catalysis for the functionalization of alkenes. This talk details our design principles underpinning the development of electrocatalytic alkene difunctionalization and hydrofunctionalization with a particular emphasis on elucidation of the catalytic mechanism. In addition, our recent forays into deep reductive electrochemistry will be discussed. In particular, the combination of electrochemistry and physical organic chemistry principles has led to the development of previous challenging organic transformations such as two- and three-component cross electrophile couplings.