

New Methodological and Technological Developments in Electrosynthesis

Owing to its many distinct characteristics, electrochemistry represents an attractive approach to discovering new reactions and meeting the prevailing trends in organic synthesis. In the past several years, we have showcased a new reaction approach that combines electrochemistry and redox-metal catalysis for the functionalization of alkenes to access a diverse array of vicinally functionalized structures. Moving beyond alkene difunctionalization, we recently expanded the scope of our electrochemical reaction discovery to the two-component and three-component cross electrophile coupling reactions for the formation of C–C, C–Si, and C–B bonds. In addition, using either electrooxidation or electroreduction, we achieved the site-selective functionalization of aliphatic and aromatic C–H bonds, respectively. This talk details our design principle underpinning the development of these new electrochemical transformations with a focus on applications in the synthesis of medicinally relevant compounds. In addition, this talk will discuss a parallel effort in the development of new electrochemical high-throughput reactors that can drastically improve the efficiency of reaction discovery and optimization.