**Toward a nature-inspired, dual-catalytic method to dehydrogenate organic compounds**

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This lecture will describe our development of a light-induced, dual-catalytic method for converting saturated hydrocarbons to alkenes with the simultaneous formation of hydrogen gas. This 'dehydrogenation' process uses two mutually compatible, base metal catalysts to generate alkenes and molecular hydrogen by sequential carbon–hydrogen bond cleavages. The sequential, catalyst-mediated hydrogen atom transfers occur at room temperature and call to mind the mechanism of nature's desaturase enzymes. In the wake of the alkene synthesis, the 'hydrido' forms of the catalysts undergo a reaction that liberates hydrogen gas and returns the catalysts to the reaction. Our ongoing efforts to achieve diverse chemical reactions that are attended by dehydrogenations will also be addressed.