

Redox-Auxiliary Catalysis

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Status:

Seeking R&D and/or
licensing partner

Patent Pending

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Redox-Auxiliary Catalysis

- Redox catalysis suffers from the requirement that the product of a reaction needs to be a stronger oxidant
- New approach to electron-transfer catalysis of chemical reactions
 - Attaching a chemical “switch” directly to the molecular substrate
 - Enhances the reactivity of the redox-appended molecules
- Produces a structural change by turning on or off catalytic activity of the appended group
 - Uses either photo, chemical or electrical stimulation.

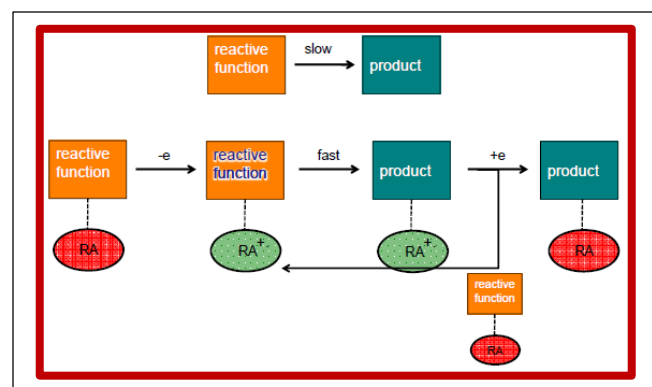


Figure 1. Schematic of redox-auxiliary catalyst attachment

Advantages of Redox-Auxiliary Catalysis

- Conversion of light energy to chemical energy of norbornadiene to quadricyclane as proof of concept.
 - Demonstrated attachment of a redox auxiliary to the norbornadiene system
 - Able to achieve a quantum yield of 0.60 (i.e. 60% of absorbed photons gave conversion) for the conversion to quadricyclane.
 - Catalytic turnover numbers achieve ≥ 1000 TON with a rate acceleration of $\geq 10^5$
- Also demonstrate the technology's utility as photo-electro switches by controlling the conformation of azobenzenes
 - Prepare the redox appended azobenzene derivatives
 - Derivatives are then irradiated with light at low temperature (-78 °C)
 - Isomerization from Z to E is rapid and occurs in less than 1 minute

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