Building a Better Bit of Catalyst-Free Binding

Scientific Achievement

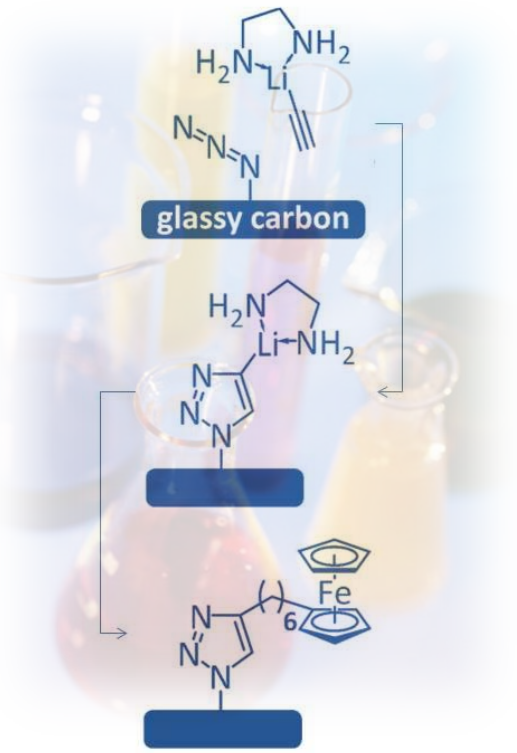
Devised a three-step synthesis process that produces functionalized carbon electrodes with the same performance as traditional methods, but with no catalyst required and with much broader synthetic flexibility.

Significance and Impact

Pushes frontiers of basic synthesis science by demonstrating covalent bonding of a variety of electrophilic coupling reagents, including alkyl halides, organic carbonyl compounds such as esters and aldehydes, and silyl chlorides, under mild and, hence, more selective conditions.

Research Details

- Azide (N_3) replaces a hydrogen substituent at a surface sp^2 carbon
- Azide cyclizes with lithium acetylide-ethylenediamine, giving a surface organolithium anchor point
- Covalent attachment of electroactive synthons affords coverages rivaling those obtained by conventional copper-catalyzed coupling.



Method adds tailored molecules to a conductive carbon electrode by attaching an azide and an organolithium alkyne in sequence (top) to produce a triazolyllithium group (middle) that can cleanly react with different reagents (bottom, with an alkylferrocene complex).

AK Das et al., *Inorg. Chem., 2013,* **52**, 13674-13684.

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