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Cryogenic Organometallic Carbon−Fluoride Bond Functionalization with Broad Functional Group Tolerance

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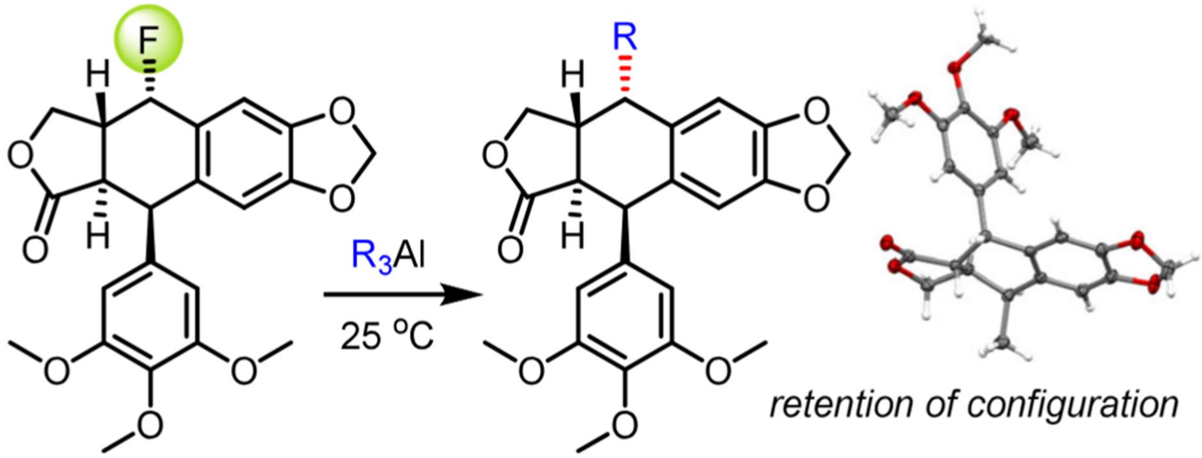
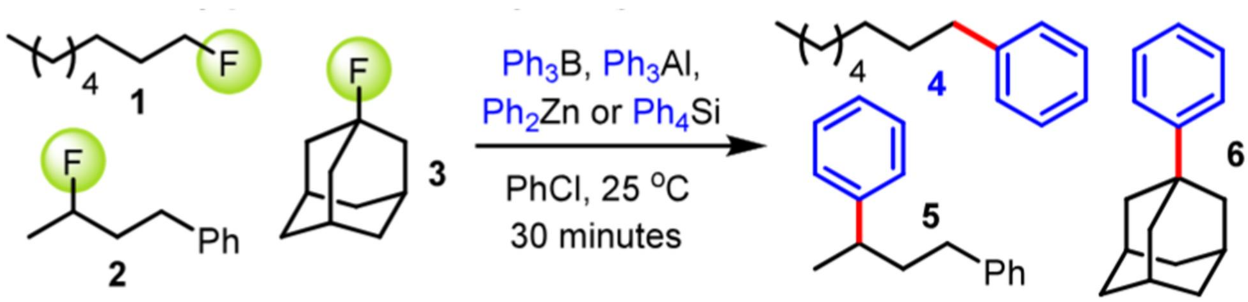
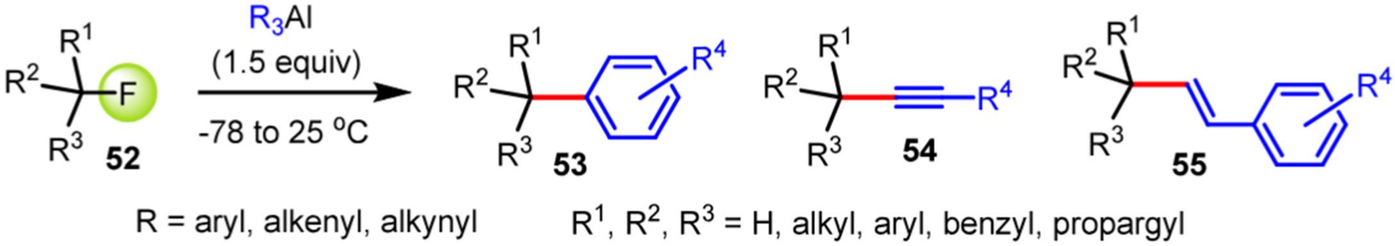
J. Am. Chem. Soc. 2025, 147, 5764−5774
https://doi.org/10.1021/jacs.4c13956



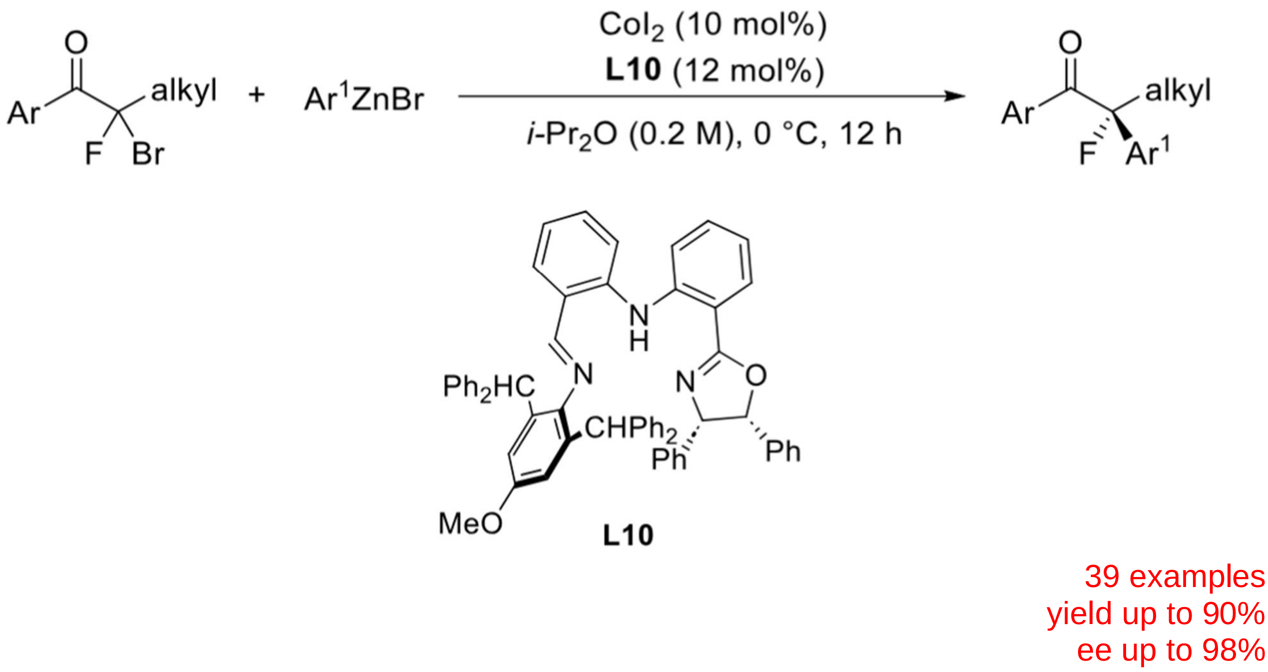




Asymmetric Cobalt Catalysis for the Construction of Quaternary Stereogenic Centers with Fluorine Atoms

Jingyi Wang, Jin Yang, Jian He, and Zhan Lu

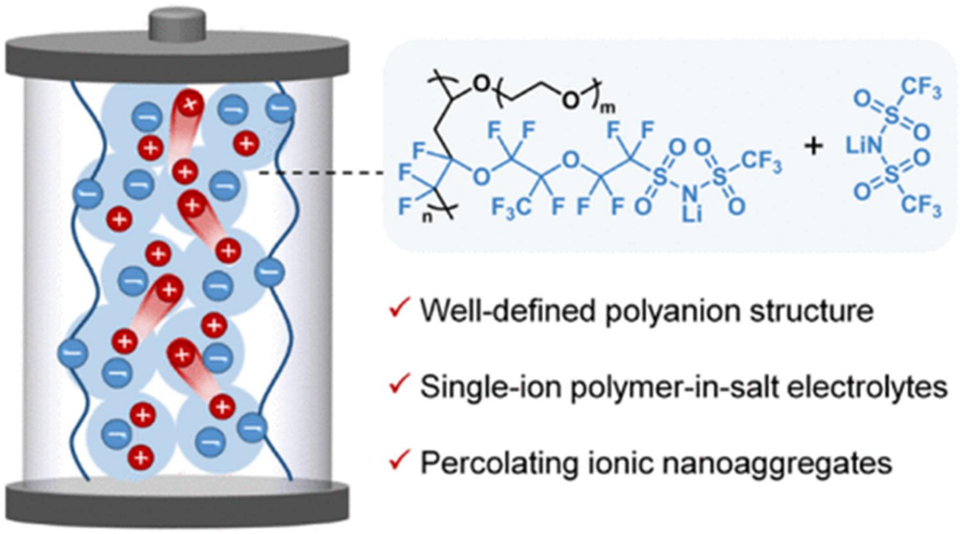
J. Am. Chem. Soc. 2025, 147, 14065−14070
https://doi.org/10.1021/jacs.5c03944



Single-Ion Polymer-in-Salt Electrolytes Enabling Percolating Ionic Nanoaggregates for Ambient-Temperature Solid-State Batteries

Huaijiao Wang, Peng Wen, Yixuan Liu, Shantao Han, Zexi Zhang, Yifei Xu, Mao Chen*, and Xinrong Lin

J. Am. Chem. Soc. 2025, 147, 14554−14563
https://doi.org/10.1021/jacs.5c01574

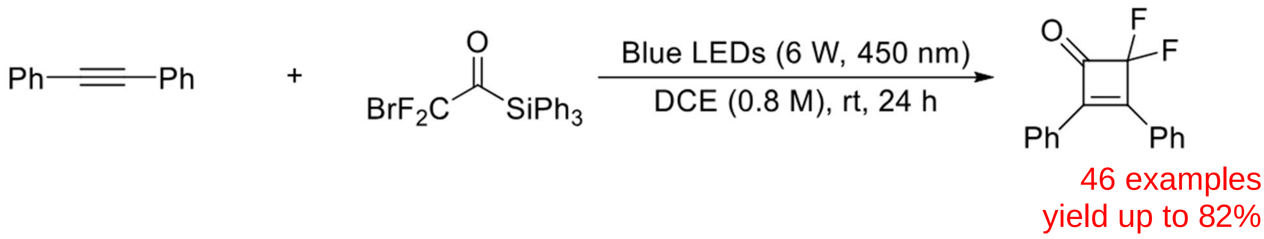


✓ Well-defined polyanion structure
✓ Single-ion polymer-in-salt electrolytes
✓ Percolating ionic nanoaggregates

Visible-Light-Induced [2 + 2] Cyclization of Alkynes with Bromo-difluoroacetylsilanes: Facile Access to gem-Difluorocyclobutenones

Gang Zhou, Yongpeng Li, Ying Liu, Xiaoqian He, Shanshan Liu, and Xiao Shen

J. Am. Chem. Soc. 2025, 147, 15955−15962
https://doi.org/10.1021/jacs.5c03504



Energy & Environmental Science

Boron–halide interactions for crystallization regulation of a 1.68 eV wide-bandgap perovskite prepared via a two-step method

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An all-solution two-step method for preparing wide-bandgap perovskites has the advantages of low cost, good repeatability and scalability. However, achieving high-quality wide-bandgap perovskite films *via* an all-solution two-step method remains challenging due to uneven distribution of halogens and incomplete reactions between organic salts and inorganic salts. Herein, we introduced **tris(pentafluorophenyl)borane (BCF)** into an inorganic layer resulting in boron–halide bonding, which stabilized uniform halide distribution and regulated the porous structure of the lead halide films, facilitating the diffusion of organic salts. Additionally, the fluorine substituents formed hydrogen bonds with organic cations, making BCF a bifunctional additive that delayed the reaction between the organic ammonium salt and the inorganic precursor, which was conducive to the growth of large-grained perovskite crystals. During the perovskite crystallization process, BCF molecules migrated to grain boundaries and the film surface, achieving a highly positive regulation influence on the nanoscale morphology and structure of the perovskite absorber films, thus leading to a pinhole-free, stress-free and less defect perovskite films. Ultimately, the approach enabled single-junction 1.68 eV wide-bandgap perovskite solar cells with a champion efficiency of 23.49% (certified 22.73%) and a V_{OC} of 1.291 V. Furthermore, the optimized perovskite films were pioneeringly and successfully integrated into monolithic perovskite/silicon tandem solar cells on textured silicon and achieved an efficiency of 31.12%, which is the highest value among tandem solar cells prepared by an all-solution two-step method, retaining >90% of initial performance after 500 hours of continuous operation.