Electron Donor-Acceptor Complex-Catalyzed Aromatic Nitration: Unveiling the Role of Polymeric Donors

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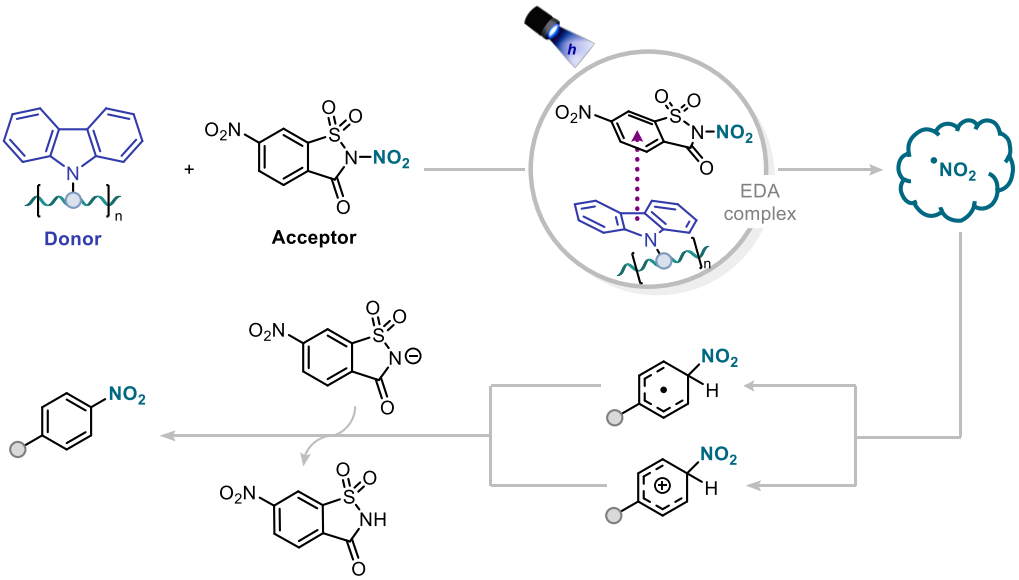
Aromatic nitration is an important transformation in organic synthesis, traditionally achieved via mixed acid nitration using concentrated nitric and sulfuric acids. While effective, this classical approach often suffers from harsh reaction conditions, limited functional group tolerance, and poor environmental compatibility. Our research group has been at the forefront of developing modern nitration protocols that overcome these challenges by employing innovative nitrating reagents and activation strategies.[1,2,3]

Building on this foundation, we herein report our pioneering work on a visible-light-driven nitration strategy that exploits electron donor–acceptor (EDA) complex catalysis. In this approach, a polymeric carbazole acts as an electron-rich donor that forms an EDA complex with *N,*6-dinitrosaccharin reagent. Upon irradiation with visible light, this complex undergoes a photoinduced single-electron transfer, facilitating the *in situ* generation of nitryl radicals. These reactive species then engage in aromatic nitration to afford the desired nitrated products, via *radical addition* or *radical-pair collapse*.

This photochemical nitration protocol stands out for its broad substrate scope, excellent functional group tolerance, and operational simplicity under metal-free and mild conditions. The integration of polymeric EDA catalysts not only enhances the efficiency and sustainability of the process but also opens new avenues in photo-induced aromatic functionalization chemistry.



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