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Frontiers in Radical Cross-Coupling: Electrocatalysis, Stereoretentive Transformations, and Applications in Drug Synthesis

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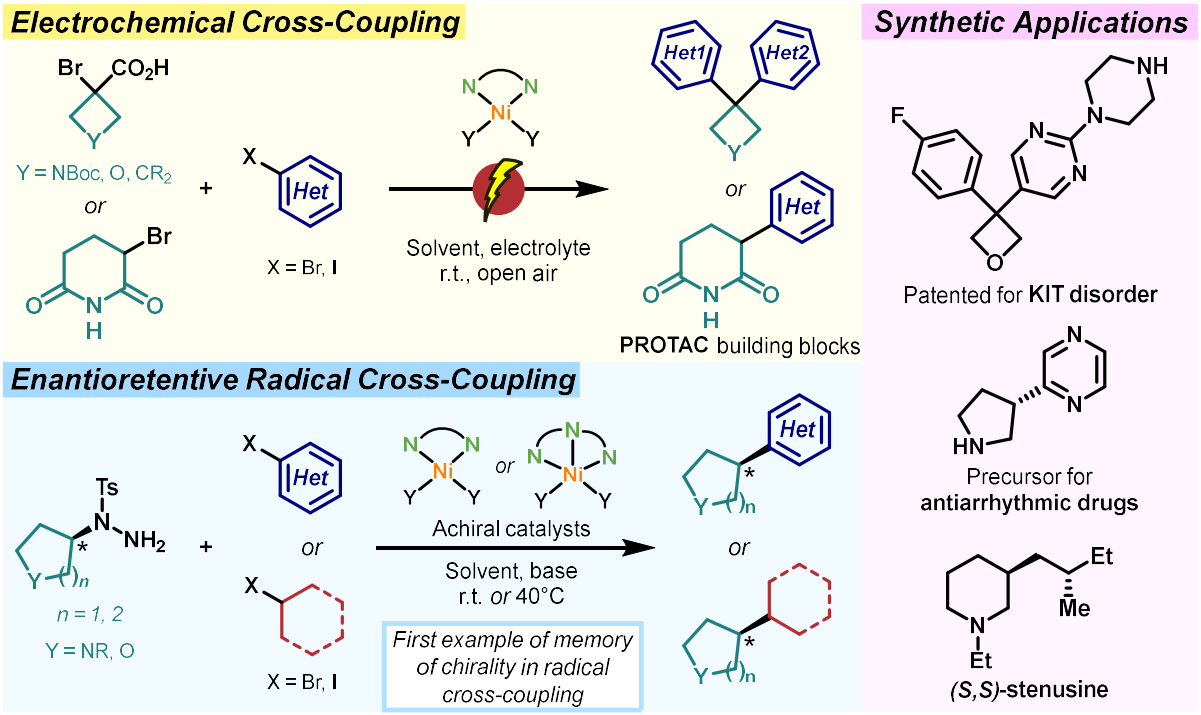
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Frontiers in Radical Cross-Coupling: Electrocatalysis, Stereoretentive Transformations, and Applications in Drug Synthesis

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Radical cross-coupling has emerged as a powerful strategy for facilitating the construction of complex molecular architectures from simple and readily available building blocks. Advances in nickel electrocatalysis have expanded this reactivity to the efficient assembly of medicinally relevant structures, including PROTAC scaffolds and highly substituted small rings.[1,2]

More recently, hydrazide-based precursors have challenged a long-standing paradigm in radical chemistry: "freely generated carbon-centered radicals lose their chiral information on the picosecond timescale (10^{-12} s)", making enantioretentive intermolecular radical cross-coupling exceptionally challenging. These radical precursors can transfer stereochemical information from chiral starting materials into newly formed C–C bonds with high fidelity.[3-4] This discovery opens new opportunities to harness the power and simplicity of radical chemistry for the streamlined synthesis of enantioenriched molecules.

<u>References (full contributions)</u>:

(† = *equal contributions*)

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Short bio

Luca Massaro completed his undergraduate and master's studies in organic chemistry at Sapienza University of Rome (2012–2017). In 2018, he joined the Andersson group at Stockholm University for his PhD, focusing on convergent and tandem strategies in iridium-catalyzed asymmetric hydrogenation of olefins. After earning his PhD in 2022, he was awarded VR postdoctoral funding to spend two years at Scripps Research (CA, USA) in the group of Phil S. Baran, working on nickel catalysis and radical chemistry for strategic C–C bond formation. In 2025, he continued his postdoctoral studies in the Lundberg lab, where he is now developing electrochemical transformations of thioethers.