Asymmetric 1,2-Dicarbofunctionalization of Alkenes with Copper/Chiral Phosphoric Acid System

**Significance:** Owing to their ready availability, asymmetric dicarbofunctionalization of alkenes remains an important topic in catalysis. The authors report a three-component asymmetric disfunctionalization of 1,1-disubstituted alkenes with a radical initiator and heteroaryl nucleophile using copper and chiral phosphoric acid (CPA) catalyst.

**Comment:** The reaction proceeds through a Kharasch-type addition across the unactivated olefin, whereupon the resultant tertiary radical undergoes a SET to form a tertiary cation. The CPA’s H-bonding affects the facial selectivity of the attack of the indole moiety in an asymmetric fashion to form the products.

**Selected examples:**
- R1 = n-C4F9, R2 = Br, R3 = NO2, R4 = n-C4F9SO2Cl, 96% yield, 95% ee
- R1 = n-C4F9, R2 = F, R3 = Br, R4 = n-C4F9SO2Cl, 97% yield, 95% ee
- R1 = n-C4F9, R2 = F3C, R3 = Togni’s reagent, R4 = Togni’s reagent, 61% yield, 98% ee

**Proposed mechanism:**

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