Catalytic Enantioselective γ-Alkylation of Carbonyl Compounds

Significance: The authors describe a new method for the catalytic enantioselective γ-(and δ-)alkylation of carbonyl compounds by cross-coupling of γ-(and δ)-haloamides with alkylboranes. The reaction is catalyzed by nickel and uses a commercially available chiral diamine ligand to achieve high enantiomeric excess.

Comment: The reaction conditions tolerate alkyl chlorides as well as alkyl bromides as suitable electrophilic cross-coupling partners. Also, an aryl metal, a boronate ester, and a secondary alkyl metal compound are able to undergo the stereoselective cross-coupling with good enantiomeric excess.

Selected examples:

- \( \text{Ph}_2\text{N} = \text{O} \text{Et} \): 63% yield, 85% ee
- \( \text{Ph}_2\text{N} = \text{O} \text{Et} \): 80% yield, 89% ee
- \( \text{Ph}_2\text{N} = \text{O} \text{Et} \): 64% yield, 90% ee
- \( \text{MeN} = \text{O} \text{Me} \): 75% yield (with 25% KI), 86% ee
- \( \text{Ph}_2\text{N} = \text{O} \text{Et} \): 74% yield, 91% ee

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