Asymmetric Arylation of Secondary Alkyl Electrophiles

Selected examples:

- \( \text{F}_3\text{C} - \text{Ph} \) with 50% yield and 87% ee (40 h reaction time)
- \( \text{F}_3\text{C} - \text{Ph} \) with 91% yield and 96% ee (gram scale)
- \( \text{F}_3\text{C} - \text{Ph} \) with 86% yield and 95% ee
- \( \text{F}_3\text{C} - \text{Ph} \) with 60% yield and 94% ee
- \( \text{F}_3\text{C} - \text{Ph} \) with 68% yield and 94% ee

Significance: Enantiodivergent cross-coupling of an arylzinc reagent and a secondary alkyl halide with a trifluoromethyl substituent was achieved by using a readily available nickel/bis(oxazoline) catalyst. The fluorinated products were obtained in good yields and with high enantioselectivities.

Comment: Fu and co-workers have previously reported an enantiodivergent cross-coupling of a racemic secondary electrophile by using a chiral nickel catalyst (J. Am. Chem. Soc. 2005, 127, 4594; J. Am. Chem. Soc. 2014, 136, 12161). The chiral catalyst can differentiate between a trifluoromethyl and an alkyl group to deliver the cross-coupling product with high enantioselectivity. The cross-coupling reaction is not air-sensitive, as identical results were obtained when the reaction was conducted in the presence of air.