Diastereoselective and Enantioselective Conjunctive Cross-Coupling Enabled by Boron Ligand Design


**Significance:** The authors describe a conjunctive cross-coupling process to access products with vicinal stereogenic centers. This method avoids the generation of Suzuki–Miyaura stilbene byproducts obtained when typical boronic esters are employed.

**Comment:** Products are obtained in moderate yields and excellent enantio- and diastereoselectivities. The synthetic utility of the –B(mac) handle is demonstrated. Additionally, this methodology was used for the synthesis of (+)-obtusafuran.

**Synthetic Examples:**

- **X = OTf:**
  - 73% yield, er > 99:1
- **X = Br:**
  - 60% yield, er > 99:1
- **X = OTI:**
  - 81% yield, er > 99:1
- **X = OTI:**
  - 47% yield, er = 99:1

**Derivatizations of alkylB(mac):**

1. **B(mac)PH**
   - PhLi, THF then Pd(OAc)₂ (1 mol%), ligand (1.2 mol%), 4-MeOPhOTf, CsF, THF, 40 °C, 15 h
   - 70% yield, dr > 20:1 (according to oxidized product)

2. **B(mac)Boc**
   - NaOH, H₂O₂, THF, r.t., 4 h
   - 92% yield

3. **B(mac)Boc**
   - MeONH₂, n-BuLi, THF, 60 °C, 15 h then BocCl
   - 89% yield

4. **B(mac)Boc**
   - BrCH₂Cl, n-BuLi, NaOTf, THF
   - 84% yield

**Synthesis of (+)-obtusafuran:**

- **cat. Pd(OAc)₂**
  - Li₂CO₃, PhI(OAc)₂, C₆F₆, 100 °C, 24 h then TBAF
  - 68% yield, dr > 20:1
- **cat. Pd(OAc)₂**
  - OTIPS, PhNH₂, THF, 100 °C, 24 h then TBAB
  - 40% yield, er > 99:1