1,3-dienes (1.1 eq.) + CO$_2$ (1 atm) + Ni(cod)$_2$ (1.0 equiv.) → Me$_2$Zn (5.0 equiv.) → 1,4-dicarboxylated products

Selected examples

- MeOOC
  - COOMe
  - COOMe
  - MeOOC
  - COOMe

- MOMO
  - MeOOC
  - COOMe
  - MeOOC
  - COOMe

- F$_3$C
  - 75%
  - HOOC
  - COOH

- 50%

*Isolated yield based on Ni(cod)$_2$

Proposed mechanism

- CO$_2$ (1 atm)
  - Ni(0)
  - R$_2$Zn
  - reductive elimination
  - backside attack
  - CO$_2$ insertion

- COOH
  - COOH
  - COOH
  - COOH

- H$^+$
  - R = Ph
  - R = Me

- Ni(0)