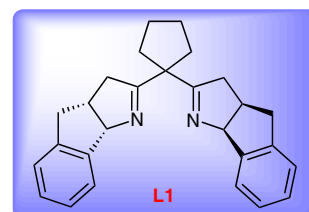
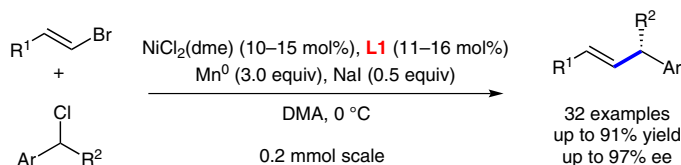


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Nickel-Catalyzed Asymmetric Reductive Cross-Coupling Between Vinyl and Benzyl Electrophiles
J. Am. Chem. Soc. **2014**, *136*, 14365–14368.

Nickel-Catalyzed Asymmetric Reductive Coupling of Vinyl and Benzyl Halides

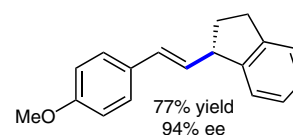
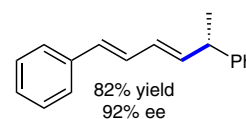
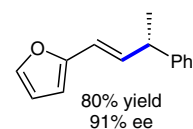


Selected examples:

R ²	R ³	Yield (%)	ee (%)
Me	H	91	93
Me	2-Me	44	85
Me	4-OMe	64	93
Et	H	80	97
Bn	H	82	93

R¹ = 4-MeOC₆H₄

R ¹	Yield (%)	ee (%)
4-MeC ₆ H ₄	83	96
4-FC ₆ H ₄	74	94
4-ClC ₆ H ₄	66	95
4-BPinC ₆ H ₄	59	94
4-OHC ₆ H ₄	86	93



Significance: The nickel-catalyzed reductive coupling of two organic electrophiles offers a unique synthetic approach to form C–C bonds (see Review below). Reisman and co-workers report an enantioselective Ni-catalyzed reductive coupling of vinyl bromides and racemic benzylic chlorides, giving rise to substituted alkenes bearing a chiral tertiary allylic center. Although transition-metal-catalyzed allylic alkylation methods using activated organometallic reagents can provide access to similar motifs, there are few regio- and enantioselective methods for the arylation of acyclic, unsymmetrical α,γ -disubstituted allylic electrophiles (for one recent example, see: S. Son, G. C. Fu *J. Am. Chem. Soc.* **2008**, *130*, 2756).

Comment: Using this method, a wide range of electron-rich and electron-deficient vinyl bromides and benzylic chlorides can be employed. Both *meta* and *para* substitution on the benzyl chloride component are well tolerated. However, *ortho*-substituted benzyl chloride derivatives demonstrate poor reactivity and lead to lower enantioselectivities. The coupled products are obtained in good to modest yields with generally high enantioselectivity. The use of β -substituted benzyl chlorides does not lead to any erosion in enantiomeric excess. Experiments using radical inhibitors or radical clocks are inconsistent with a radical chain mechanism.

Review: D. A. Everson, D. J. Weix *J. Org. Chem.* **2014**, *79*, 4793–4798.

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