

Synthesis Alerts is a monthly feature to help readers of *Synthesis* keep abreast of new reagents, catalysts, ligands, chiral auxiliaries, and protecting groups which have appeared in the recent literature. Emphasis is placed on new developments but established reagents, catalysts etc are also covered if they are used in novel and useful reactions. In each abstract, a specific example of a transformation is given in a concise format designed to aid visual retrieval of information.

Synthesis Alerts is a personal selection by:

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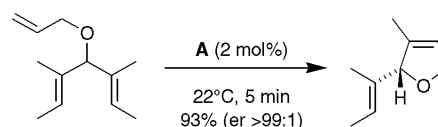
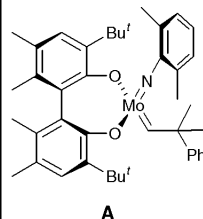
The journals regularly covered by the abstractors are:

Angewandte Chemie International Edition
 Bulletin of the Chemical Society of Japan
 Chemical Communications
 Chemistry A European Journal
 Chemistry Letters
 European Journal of Organic Chemistry
 Helvetica Chimica Acta
 Heterocycles
 Journal of the American Chemical Society
 Journal of Organic Chemistry
 Organometallics
 Perkin Transactions 1
 Synlett
 Synthesis
 Tetrahedron
 Tetrahedron Asymmetry and Tetrahedron Letters

Chiral molybdenum metathesis catalyst

Catalyst

Complex A accomplishes an asymmetric synthesis of dihydrofurans via catalytic kinetic resolution or enantioselective desymmetrisation of diallyl ethers.



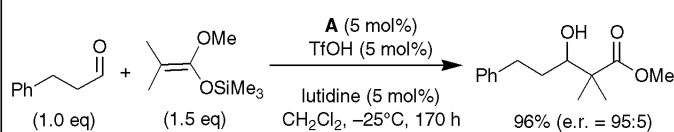
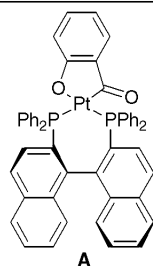
D. S. La, J. B. Alexander, D. R. Cefalo, D. D. Graf, A. H. Hoveyda, R. R. Schrock *J. Am. Chem. Soc.* **1998**, *120*, 9720.

4 examples of kinetic resolution in which *unreacted* diallyl ether is obtained in 75, 92-98% ee; 6 examples of desymmetrisation (yields 28, 83-91%; ee 10, 73-99%). Reactions are run neat.

Pt(OC₆H₄CO)[(R)-BINAP]

Catalyst

The title compound catalyses the asymmetric aldol addition of methyl trimethylsilyl dimethylketene acetal to aldehydes.



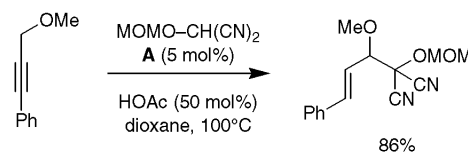
O. Fujimura *J. Am. Chem. Soc.* **1998**, *120*, 10032.

7 aldehyde substrates tried. *t*-BuCHO does not work at all; *c*-C₆H₅CHO gives low yields. Unhindered aldehyde gives 66-99% yield and 10-91% ee

Tetrakis(triphenylphosphine)palladium(0)

Catalyst

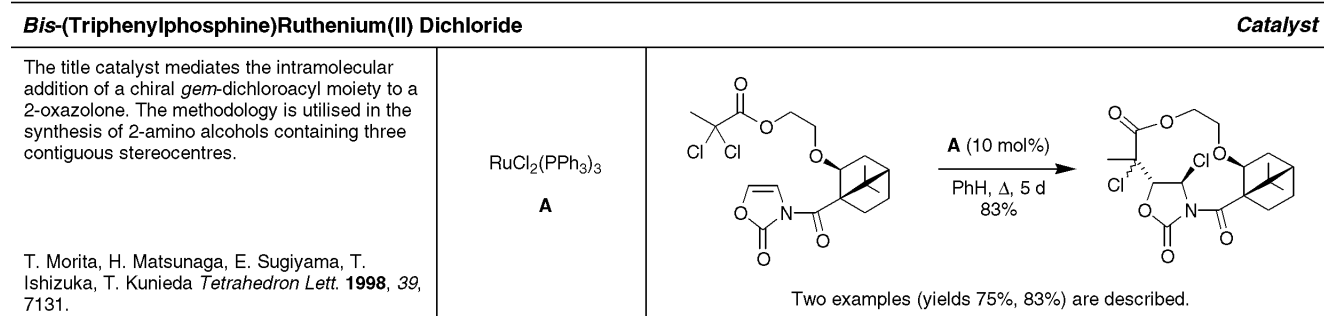
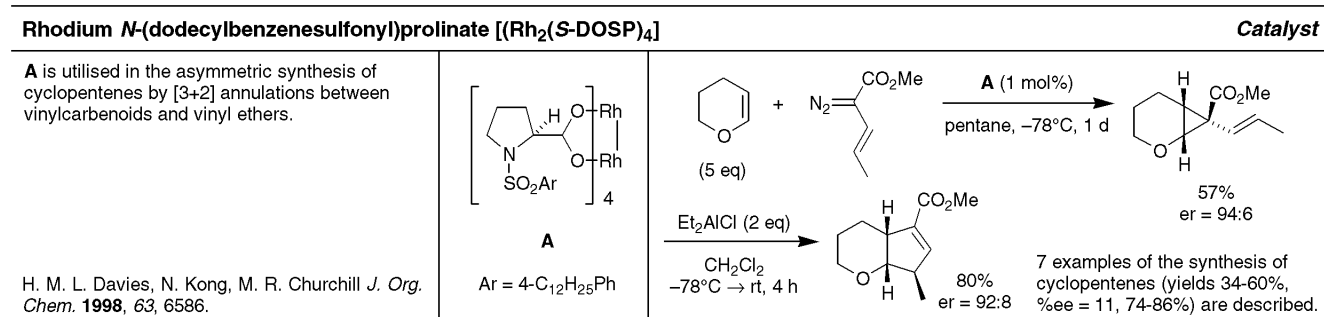
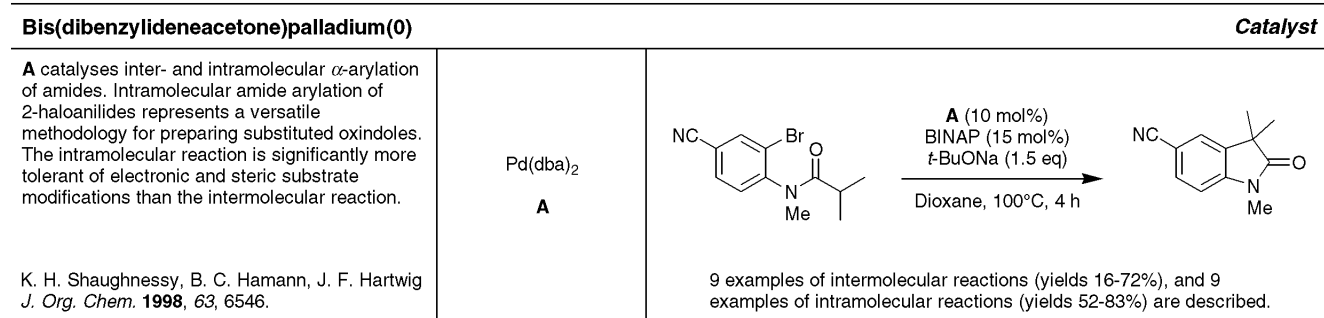
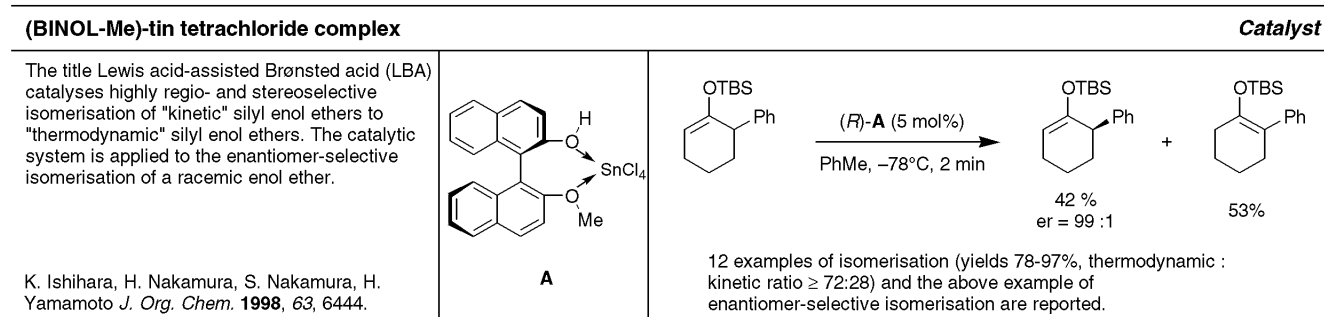
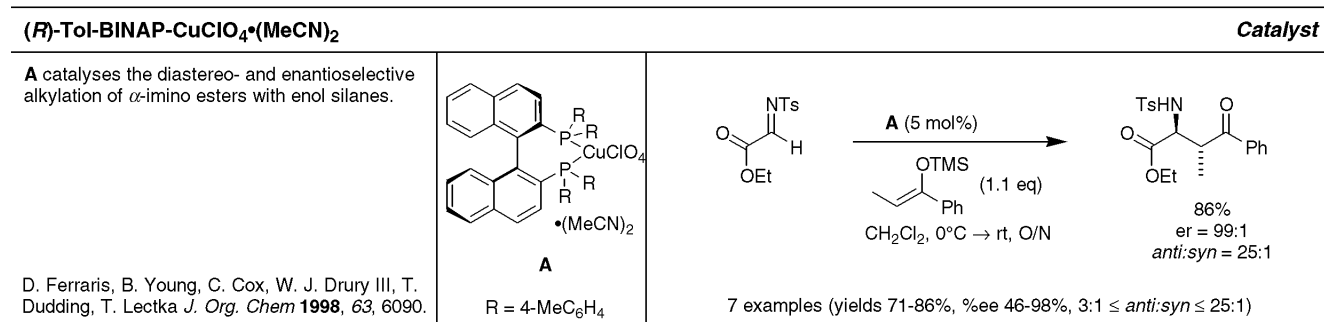
Symmetrical dialkyl alkynes and phenyl alkyl alkynes react with pronucleophiles in the presence of Pd(0) and acetic acid to give allylation products.

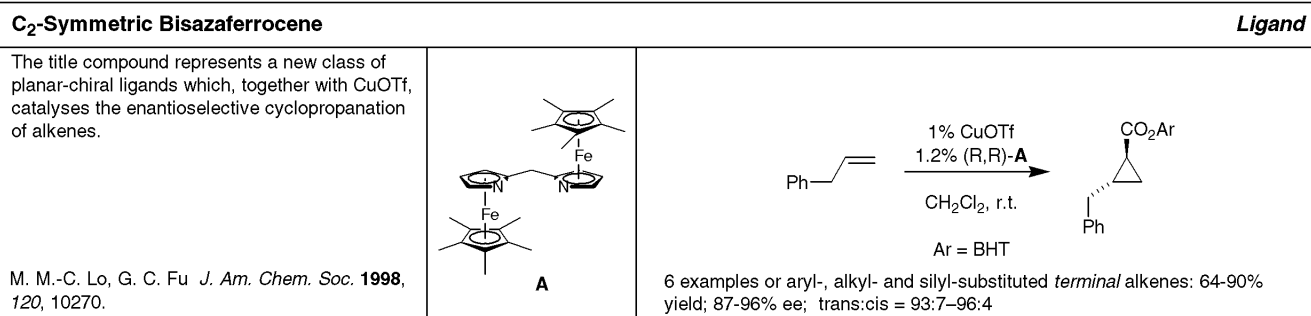
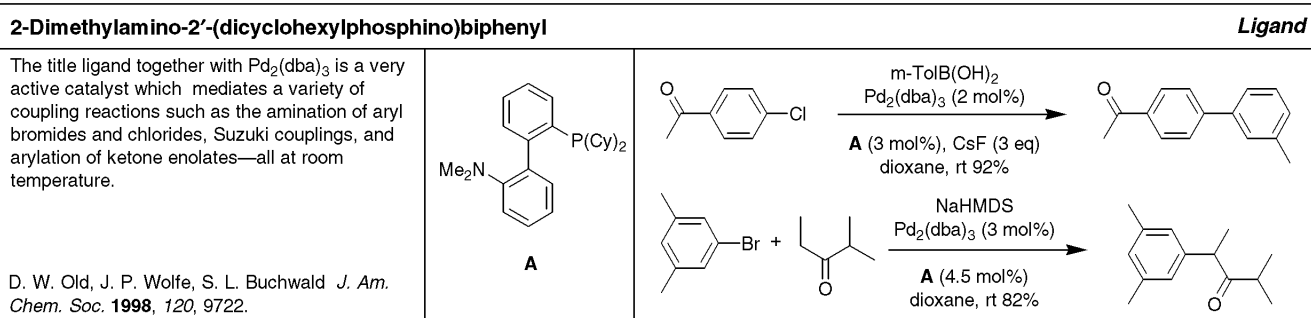
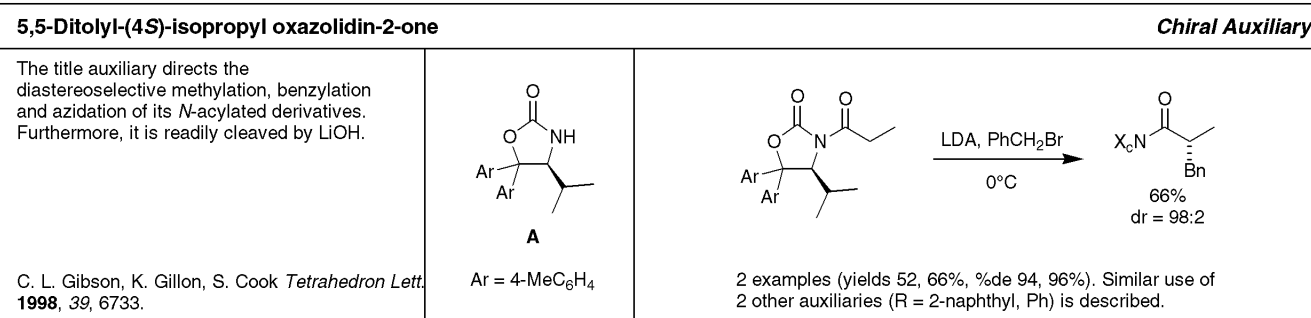
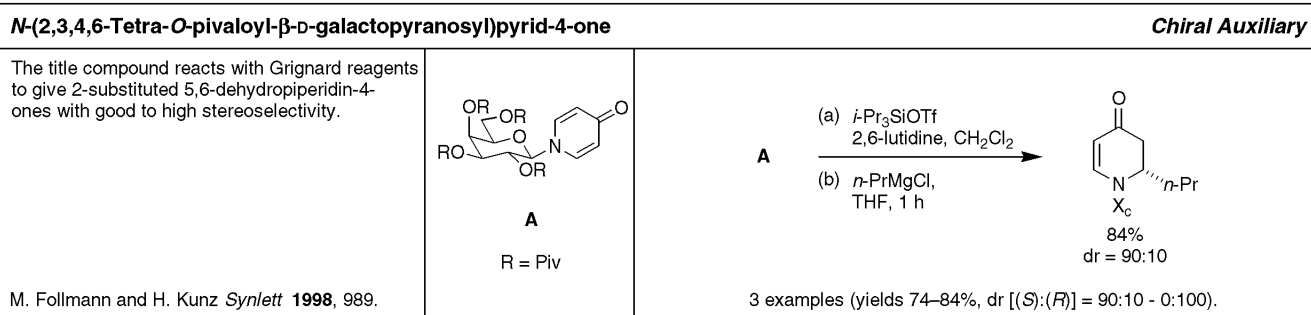
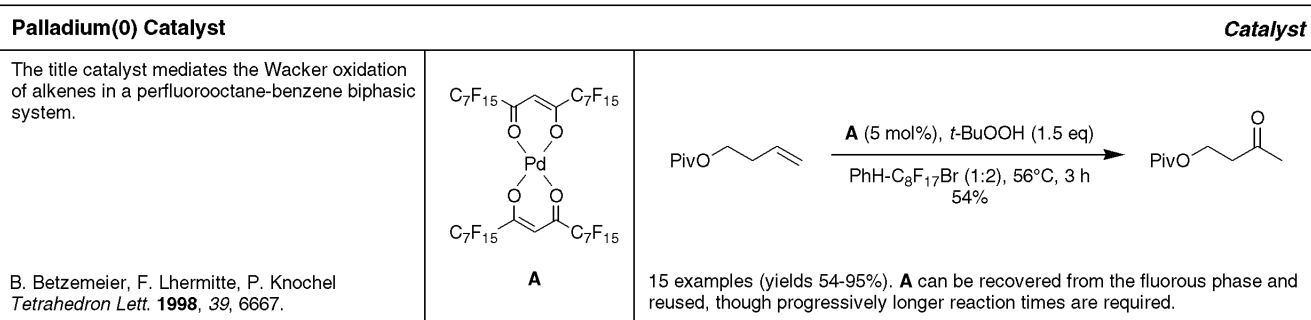


I. Kadota, A. Shibuya, Y. S. Gyoung, Y. Yamamoto *J. Am. Chem. Soc.* **1998**, *120*, 10262.

10 examples involving 6 alkynes and 5 pronucleophiles gave 64-99% yield allylated products. 3 examples of intramolecular allylation (84-93%) are also reported.

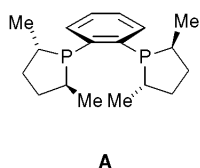
Indium(III) Chloride		Catalyst
<p>The title reagent catalyses the Michael reaction between primary or secondary amines and α,β-ethylenic compounds in water under mild conditions. A can be recovered and re-used without loss of activity.</p>	<p>InCl₃ A</p>	<p>(i-Pr)₂NH + $\text{CH}_2=\text{CH-CN}$ (A 20 mol%) H₂O, rt, 16 h 82%</p> <p>(i-Pr)₂N-CH₂-CH₂-CN</p> <p>22 examples (yields 6-98%).</p>
T.-P. Loh and L.-L. Wei <i>Synlett</i> 1998 , 975.		
Microencapsulated Osmium Tetraoxide (MC OsO ₄)		Catalyst
<p>Preparation and use of A for the dihydroxylation of olefins is reported. The catalyst can be recovered and re-used without loss of activity.</p>	<p>MC OsO₄ A</p>	<p>A (5 mol%) NMO (1.3 eq) H₂O-Me₂CO-MeCN (1:1:1), rt 76%</p> <p>11 examples (yields 68-89%) are reported.</p>
S. Nagayama, M. Endo, S. Kobayashi <i>J. Org. Chem.</i> 1998 , 63, 6094.		
Bis(cyclopentadienyl)zirconium dichloride		Catalyst
<p>The zirconium-catalysed reactions of alkynyl halides with EtMgBr are reported. The reaction proceeds via a zirconocene-ethylene complex and a zirconacycle to yield cyclobutene derivatives.</p>	<p>Cp₂ZrCl₂ A</p>	<p>EtMgBr (3 eq) A (10 mol%) THF, rt, 1 d 51%</p> <p>4 examples (yields 50-61%).</p>
K. Kasai, Y. Liu, R. Hara, T. Takahashi <i>Chem. Commun.</i> 1998 , 1989.		
Tetrabutylammonium Bromide / Tetrabutylammonium iodide		Catalyst
<p>Tetrabutylammonium halides promote carbonyl propargylation or allenylation. Selectivity between propargylation and allenylation depends on the halide.</p>	<p>Bu₄NBr A Bu₄NI B</p>	<p>X = Br SnCl₂ (1 eq), A (30 mol%) H₂O, rt, 12 h 1, 63% (1:2 = 100:0)</p> <p>X = Cl; NaI (1.5 eq) SnI₂ (1 eq), TBAI (10 mol%) H₂O, 0°C, 4 d 2, 50% (1:2 = 7:93)</p> <p>6 examples of propargylations (yields 48-77%, selectivity 100%) and 6 examples of allenylations (yields 50-80%, selectivity 80-98%) are reported.</p>
Y. Masuyama, A. Ito, M. Fukuzawa, K. Terada, Y. Kuruu <i>Chem. Commun.</i> 1998 , 2025.		
<i>m</i> -Trifluoromethylstyrene		Catalyst
<p>A is a cocatalyst in the cross coupling of organozinc species and organic halides.</p>	<p> A</p>	<p>[PivO(CH₂)₃]₂Zn (2 eq) [Ni(acac)₂] (10 mol%), A (50 mol%) THF-NMP (2:1) -78°C → -35°C, 2.5 h 70%</p> <p>8 examples (yields 66-78%).</p>
R. Giovannini, T. Stüdemann, G. Dussin, P. Knochel <i>Angew. Chem. Int. Ed.</i> 1998 , 37, 2387.		



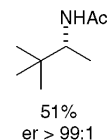


(S,S)-1,2-Bis(2,5-dimethylphospholano)benzene (Me-DuPHOS)**Ligand**

A rhodium catalyst derived from the title ligand is utilised in a three-step procedure for the asymmetric catalytic reductive amination of ketones.



- (a) NaOAc (1.1 eq), NH₂OH (1.1 eq)
MeOH, rt, 8 h
(b) Ac₂O (3 eq), HOAc (3 eq), Fe (2 eq)
PhMe, 70°C, 4 h
(c) [A-Rh(COD)]BF₄ (0.2 mol%)
H₂ (200 psi)
MeOH, rt, 20 h

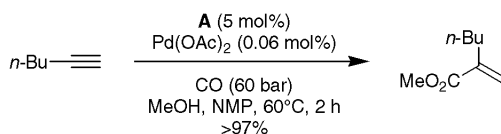
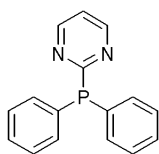


M. J. Burk, G. Casey, N. B. Johnson *J. Org. Chem.* **1998**, *63*, 6084.

2 examples of reductive amination using **A** and (*R,R*)-**A** are reported (yields 32, 51%, ee > 99:1).

2-Pyrimidylidiphenylphosphine**Ligand**

The title ligand mediates the palladium(II)-catalysed carbonylation of terminal and internal alkynes.

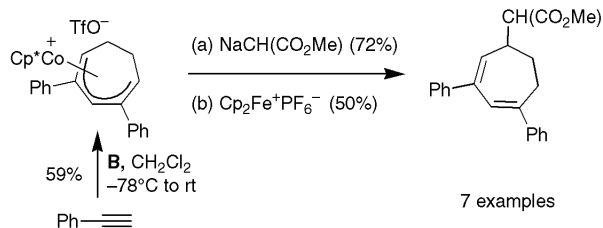
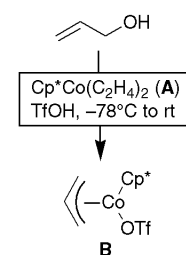


M. T. Reetz, R. Demuth, R. Goddard *Tetrahedron Lett.* **1998**, *39*, 7089.

6 examples (yields 25, 48->97%) are described. *Bis*- or *tris*-2-pyrimidyl substituted phosphines resulted in significantly longer reaction times.

Cp*Co(C₂H₄)₂**Reagent**

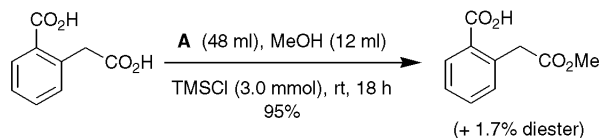
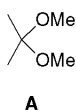
Complexes **B** derived from the title compound **A** undergo intermolecular allyl/alkyne [3+2+2] cycloaddition reactions to give cationic η⁵-cycloheptadienyl complexes which can alkylate soft nucleophiles.



N. Etkin, T. L. Dzwiniel, K. E. Schweibert, J. M. Stryker *J. Am. Chem. Soc.* **1998**, *120*, 9707.

2,2-Dimethoxypropane**Reagent**

The title compound, methanol and a catalytic amount of HCl selectively esterifies aliphatic carboxylic acids in the presence of aromatic carboxylic acids. The reaction gives high yields and takes place at room temperature.

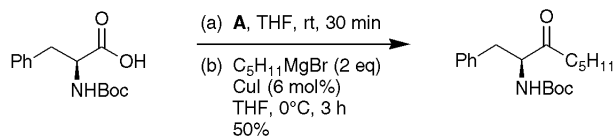
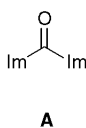


A. Rodriguez, M. Nomen, B. W. Spur, J. J. Godfroid *Tetrahedron Lett.* **1998**, *39*, 8563.

6 examples of substrates with both aliphatic and aromatic carboxylic acids (>95% yield); 16 examples of aliphatic carboxylic acids (usually 100% yield). Even in the presence of 20 mol% TMSCl, aromatic carboxylic acids give very low yields of the ester (typically <3%).

N,N-Carbonyldiimidazole**Reagent**

A is utilised in a convenient conversion of α-aminoacids into NH-Boc protected α-aminoketones via imidazolides.



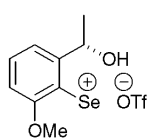
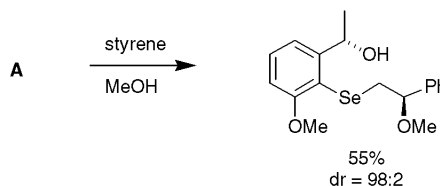
B. F. Bonini, M. Comes-Franchini, M. Fochi, G. Mazzanti, A. Ricci, G. Varchi *Synlett* **1998**, 1013.

9 examples (yields 30-68%).

Indium		Reagent
<p>Treatment of a range of aromatic nitro compounds with A and aqueous ethanolic ammonium chloride results in selective reduction of the nitro groups; ester, nitrile, amide and halide substituents are unaffected.</p> <p>C. J. Moody and M. R. Pitts <i>Synlett</i> 1998, 1028.</p>	<p>In</p> <p>A</p>	<p>11 examples (yields 60-99%).</p>
Samarium(II) iodide / Nickel(II) iodide		Reagent
<p>In the presence of the title reagent pair, β-lactones react with aldehydes, ketones and imines to afford tetrahydrofuranones and pyrrolidinones in good to high yield.</p> <p>F. Machrouhi, J.-L. Namy <i>Tetrahedron</i> 1998, <i>54</i>, 11111.</p>	<p>Sml₂</p> <p>A</p> <p>Nil₂</p> <p>B</p>	<p>17 examples of coupling with aldehydes and ketones (yields 0, 74-98%) and 7 examples of coupling with imines (yields 70-93%) are reported.</p>
Metals on polyethylene solid support		Reagent
<p>Convenient preparation of "high-surface alkali metals" deposited on solid-supports and subsequent use in a variety of reactions is reported. The metals can be stored as stable suspensions in inert solvents if protected against oxygen. Preparation of Zn on solid-support is also reported.</p> <p>M. Makosza, P. Nieczypor, K. Grell <i>Tetrahedron</i> 1998, <i>54</i>, 10827.</p>	<p>M / Polyethylene (PE)</p> <p>M = Li, Na, K, Zn</p>	<p>36 examples in total of the use of Na-PE in the acylion reaction, formation of organolithium species using Li-PE and trapping with electrophiles, an intramolecular Dieckmann cyclisation utilising K-PE and Reformatsky and Barbier-type reactions using Zn-PE are reported. Yields are good to excellent.</p>
Copper(I) Chloride		Reagent
<p>The title reagent mediates the intermolecular homocoupling of alkenyltrimethylstannanes, to afford functionalised conjugated dienes and tetraenes in good to high yield.</p> <p>E. Piers, P. L. Gladstone, J. G. K. Yee, E. J. McEachern <i>Tetrahedron</i> 1998, <i>54</i>, 10609.</p>	<p>CuCl</p> <p>A</p>	<p>17 examples (yields 18-91%) are reported.</p>
1-(Triisopropylsilyloxy)-1-(tert-butylthio)ethene		Reagent
<p>Exceptional Cram-type selectivities in Mukaiyama aldol reactions of A are reported. The level of 1,2-asymmetric induction is promoted by the bulk of the silyl group.</p> <p>A. P. Davis, S. J. Plunkett, J. E. Muir <i>Chem. Commun.</i> 1998, 1797.</p>	<p>A</p>	<p>3 examples (yields 76-78%, 5:1 ≤ <i>syn:anti</i> ≤ 130:1) are described.</p>

(R)-2-Methoxy-6-(1-hydroxyethyl)phenylselenenyl triflate**Reagent**

The asymmetric methoxyselenenylation of styrene derivatives using **A** is reported.

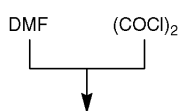
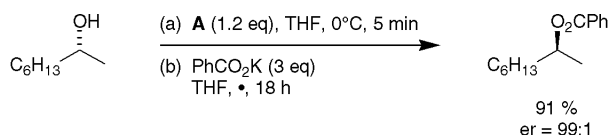
**A**

6 examples (yields 42-66%, %de = 20-96%).

G. Fragale, M. Neuburger, T. Wirth *Chem. Commun.* **1998**, 1867.

(Chloromethylene)dimethylammonium chloride**Reagent**

The title compound (generated *in situ* from DMF and oxalyl chloride) reacts with secondary alcohols to form imidate esters. Reaction with potassium carboxylates or potassium phthalimide gives products with clean inversion of stereochemistry.

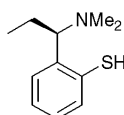
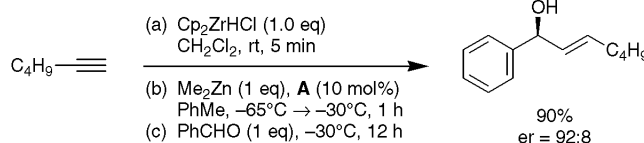
**A**

17 examples of ester formation (yields 15-91%, %ee = 51->95%) and 9 examples of formation of phthalimido derivatives (yields 25-98%, %ee = 0, 72-96%) are reported.

A. G. M. Barrett, D. C. Braddock, R. A. James, N. Koike, P. A. Procopiu *J. Org. Chem.* **1998**, *63*, 6273.

2-(R)-1-[(Dimethylamino)propyl]thiophenol**Reagent**

In situ hydrozirconation of alkynes, transmetalation to zinc, and addition to aldehydes catalysed by **A** provides an efficient protocol for the asymmetric preparation of (*E*)-allylic alcohols.

**A**

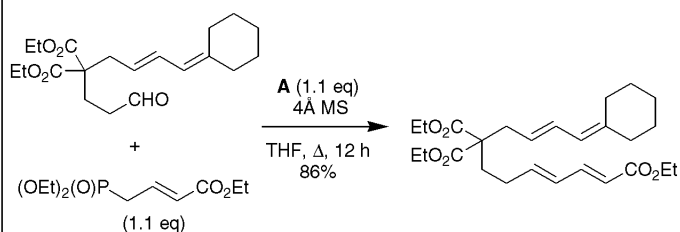
10 examples (yields 63-90%, %ee 63-99)

P. Wipf, S. Ribe *J. Org. Chem.* **1998**, *63*, 6454.

Lithium Hydroxide**Reagent**

A promotes Horner-Wadsworth-Emmons dienylation of aldehydes and ketones.

LiOH

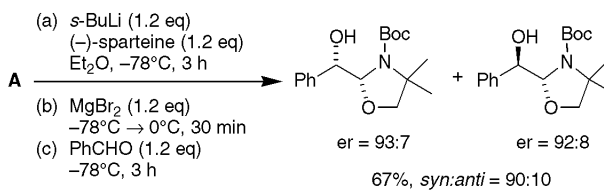
A

9 examples (yields 64-99%).

J. M. Takacs, M. R. Jaber, F. Clement, C. Walters *J. Org. Chem.* **1998**, *63*, 6757.

N-Boc-4,4-dimethyl-1,3-oxazolidine**Reagent**

Formation and reaction of the 2-metallated title reagent in the presence of (-)-sparteine is described representing a new chiral formyl anion equivalent. The two diastereoisomers are formed with high enantioselectivity although little diastereoselectivity is observed in the absence of MgBr₂.

**A**

1 example is reported.

N. Kise, T. Urai, J. Yoshida *Tetrahedron: Asymmetry* **1998**, *9*, 3125.

Tributyltin Methoxide		Reagent
<p>A facilitates transmetallation from aluminium to tin in a preparation of tributylstannyprop-2-en-1-ols.</p>	<p>Bu_3SnOMe</p> <p>A</p>	<p>(a) NaOMe (7.5 mol%) LiAlH₄ (1.1 eq) THF, 0°C, 1 h</p> <p>(b) Bu_3SnOMe (1 eq) 4°C, 2 d 74%</p> <p>12 examples (yields 13-74%).</p>
<p>M. Havránek, D. Dvůrák <i>Synthesis</i> 1998, <i>9</i>, 1264.</p>		
Iodine / Bis-(trifluoroacetoxy)iodobenzene		Reagent
<p>The title reagent pair effects the iodination of a variety of functionalised olefins.</p>	<p>I_2</p> <p>A</p> <p>Ph-C(O)OCF_3</p> <p>B</p>	<p>A (60 mol%), B (60 mol%)</p> <p>Pyridine (1.2 eq) CH₂Cl₂, rt, 36 h 56%</p> <p>10 examples (yields 23, 56-96%) are described.</p>
<p>R. Benhida, P. Blanchard, J.-L. Fourrey <i>Tetrahedron Lett.</i> 1998, <i>39</i>, 6849.</p>		
Sodium 2-Ethylhexanoate		Reagent
<p>The title reagent, which is soluble in common organic solvents, mediates the practical acylation of amines.</p>	<p>$\text{CH}_3(\text{CH}_2)_4\text{CH}_2\text{CO}_2\text{Na}$</p> <p>A</p>	<p>A (1 eq) ClCH₂COCl (1 eq)</p> <p>THF, rt > 90%</p> <p>4 examples (yields 80->90%) are described. The reaction does not proceed via a mixed anhydride and therefore gives single acylation products.</p>
<p>J. Fitt, K. Prasad, O. Repic, T. J. Blacklock <i>Tetrahedron Lett.</i> 1998, <i>39</i>, 6991.</p>		
Manganese tris(acetylacetonate)		Reagent
<p>The title catalyst mediates the diastereoselective oxidative coupling of <i>seco</i>-biaryl compounds to give symmetrical and unsymmetrical BINOL-derivatives.</p>	<p>$\text{Mn}(\text{acac})_3$</p> <p>A</p>	<p>A (1.2 eq)</p> <p>CH₃CN, 50°C</p> <p>75%, dr = 95:5</p> <p>9 examples (yields 69-89%, %de 84-97%) are described.</p>
<p>B. H. Lipshutz, Y.-J. Shin <i>Tetrahedron Lett.</i> 1998, <i>39</i>, 7017.</p>		
Sodium Borohydride		Reagent
<p>The title reagent in aqueous THF mediates the reductive cleavage of <i>N</i>-acyloxazolidinones.</p>	<p>NaBH_4</p> <p>A</p>	<p>A (4 eq)</p> <p>THF-H₂O (3:1), rt</p> <p>95% er >99:1</p> <p>13 examples (yields 75-95%, %ee >99%) are described. In contrast, use of LiBH₄ resulted in ~10% racemisation.</p>
<p>M. Prashad, D. Har, H.-Y. Kim, O. Repic <i>Tetrahedron Lett.</i> 1998, <i>39</i>, 7067.</p>		