**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:

John Cooksey, Victoria Coombes, Axel Jansen, Stephen McAteer, and Joanne Peach, Department of Chemistry, Leeds University, Leeds, LS2 9JT, UK.

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
- Collection Czechoslovak Chemical Communications
- European Journal of Organic Chemistry
- Helvetchica Chimica Acta
- Heterocycles
- Journal of the American Chemical Society
- Journal of Organic Chemistry
- Organic and Biomolecular Chemistry
- Organic Letters
- Organometallics
- Synlett
- Synthesis
- Tetrahedron
- Tetrahedron Asymmetry
- Tetrahedron Letters

Nickel coupling reactions: 11 examples (yields 50-89%, 90:10 × regioselectivities > 95.5%); Hydrogenation: 8 examples (yields 76-96%).

---

**Alkene-directed, Ni-catalyzed alkyne coupling reactions.**


![Chemical structure](image)

**C-C Bond Formation**

11 examples (yields 50-89%, 90:10 × regioselectivities > 95.5%); Hydrogenation: 8 examples (yields 76-96%).

---

**Synthesis of allylic amines via a phosphoramide rearrangement.**


![Chemical structure](image)

**[3,3]-Sigmatropic Rearrangement**

11 examples (yields 55-88%).

---

**Synthesis of functionalized β- and δ-diketones via an intermolecular carboxylative cascade reaction.**


![Chemical structure](image)

**Radical Carboxylation**

15 examples (yields 56-92%, %de 0-20%).
Transition-metal free aerobic oxidation of alcohols.

\[
\begin{align*}
\text{OH} & \quad \text{TEMPO (1 mol\%) Br}_2 (4 \text{ mol\%}) \quad \text{NaNNO}_2 (4 \text{ mol\%}) \\
& \quad \text{air (0.4MPa)} \quad \text{CH}_2\text{Cl}_2, 80 \, ^\circ\text{C}, 1.5 \text{ h} \quad 98\% \\
\rightarrow & \quad \text{O} \\
\text{N} & \quad \text{Me} \\
\text{Ph} & \quad \text{Me} \\
\text{TFA} & \quad \text{Me}
\end{align*}
\]

16 examples (yields 0-99%).

Direct, enantioselective organocatalytic \(\alpha\)-chlorination of aldehydes.

\[
\begin{align*}
\text{Cl} & \quad \text{Cl} \\
\text{H} & \quad \text{Me} \\
\text{Cl} & \quad \text{Me} \\
\text{H} & \quad \text{Me}
\end{align*}
\]

A (5 mol\%) acetone, \(-30 \, ^\circ\text{C}, 6 \text{ h}

(1.2 equiv.)

79% er = 99:1
dr = 24:1

9 examples (yields 71-94\%, 80-99\%).

Yet controlled approach towards ebe lactone A using organosilicon chemistry.

\[
\begin{align*}
\text{SiMe}_3 & \quad \text{H} \\
\text{OTIPS} & \quad \text{TIPS}
\end{align*}
\]

(1.2 equiv.)

(a) TESOT (2 equiv.) 2,6-lutidine (5 equiv.) CH\(_2\)Cl\(_2\), rt, 1 d

(b) (PhMe\(_2\))\(_2\)CuLiHUCN (6 equiv.) THF, 0 \, ^\circ\text{C}, 1 h

(c) NiS (10 equiv.) THF-MeCN (1:3), rt, 18 h

59\% (3 steps)

Synthesis of chiral \(\alpha\)-alkyl serines via an enantioselective phase-transfer catalysed alkylation.

\[
\begin{align*}
\text{Br} & \quad \text{R} \\
\text{N} & \quad \text{R} \\
\text{R} = 3',4',5'-\text{trifluorophenyl}
\end{align*}
\]

11 examples (yields 48-99\%, 93-99\%).

Phosphine catalyzed \(\alpha\)-arylation of enones and enals using hypervalent bismuth reagents.

\[
\begin{align*}
\text{Br} & \quad \text{Br} \\
\text{Me} & \quad \text{Me} \\
\text{Me} & \quad \text{Me}
\end{align*}
\]

PBu\(_3\) (20 mol\%) PhBr (5 equiv.) KOH (5 equiv.) PhMe, 0 \, ^\circ\text{C}, 5 h

98\% er > 99.5:0.5

22 examples (yields 44-93\%).
Cu-mediated, Pd-catalyzed coupling of thiol esters with aliphatic organoboron reagents.

\[
\begin{array}{c}
\text{S} \quad \text{O} \\
\end{array}
\quad + 
\begin{array}{c}
\text{B} \\
\end{array}
\quad \xrightarrow{(1.2 \text{ equiv.})}
\begin{array}{c}
\text{CuTc} (1.2 \text{ equiv.}) \\
\text{C}_{6} \text{H}_{5} \text{CO}_{2} (1 \text{ equiv.}) \\
Pd\text{(PhMe}_{3}\text{)}_{2} (5 \text{ mol\%}) \\
\text{THF, 45 °C, 16 h} \\
64\%
\end{array}
\begin{array}{c}
\text{O} \\
\end{array}
\]

CuTc = Cu(II)-thiophene-2-carboxylate. 15 examples (yields 21-90%).

Rhenium-catalyzed direct C-H addition of 4,4-dimethyl-2-oxazoline to alkenes.

\[
\begin{array}{c}
\text{N} \quad \text{O} \\
\end{array}
\quad + 
\begin{array}{c}
\text{N} \\
\end{array}
\quad \xrightarrow{(5 \text{ equiv.})}
\begin{array}{c}
\text{PCy}_{3} (5 \text{ mol\%}) \\
\text{THF, 45 °C, 18 h} \\
46\%
\end{array}
\begin{array}{c}
\text{N} \quad \text{O} \\
\end{array}
\quad + 
\begin{array}{c}
\text{O} \\
\end{array}
\quad \xrightarrow{(5 \text{ equiv.})}
\begin{array}{c}
\text{PCy}_{3} (2.5 \text{ mol\%}) \\
\text{THF, 45 °C, 18 h} \\
58\%
\end{array}
\begin{array}{c}
\text{N} \quad \text{O} \\
\end{array}
\]

coe = cis-cyclooctene. 11 examples (yields 37-86%).

Synthesis of tertiary carbinamines via an enantioselective alkylation of ketone-derived benzoylhydrazones.

\[
\begin{array}{c}
\text{NHBz} \\
\text{Ph} \quad \text{Me} \\
\end{array}
\quad + 
\begin{array}{c}
\text{Ph} \quad \text{N} \quad \text{SiCl} \\
\text{Me} \quad \text{Ph} \\
\end{array}
\quad \xrightarrow{(1.5 \text{ equiv.})}
\begin{array}{c}
\text{HCl} \quad \text{Me} \\
\text{Me} \quad \text{Me} \\
\end{array}
\quad \xrightarrow{(a) \text{ CHCl}_{3}, 40 °C, 1 \text{ d}}
\begin{array}{c}
\text{NHBz+HCl} \\
\text{Ph} \quad \text{Me} \\
\end{array}
\quad \xrightarrow{(b) \text{ HCl (1.1 equiv.)}}
\begin{array}{c}
\text{Me} \\
\text{Ph} \\
\end{array}
\quad \xrightarrow{(c) \text{ recrystallization (EICH)}}
\begin{array}{c}
\text{Me} \\
\text{Ph} \\
\end{array}
\quad \xrightarrow{74\%, \text{ er } = 99:1}
\begin{array}{c}
\text{Me} \\
\text{Ph} \\
\text{NH}_{2} \\
\end{array}
\]

Asymmetric Allylation
15 examples (yields 46-95%, %ee 84-98%).

Synthesis of alkylhydrazides via a Co-catalyzed hydroimidation reaction of olefins and azodicarboxylates.

\[
\begin{array}{c}
\text{C} \quad \text{N} \\
\end{array}
\quad + 
\begin{array}{c}
\text{N} \\
\end{array}
\quad \xrightarrow{(1.5 \text{ equiv.})}
\begin{array}{c}
\text{A} \quad \text{Na}^{+} \\
\end{array}
\quad \xrightarrow{r-\text{BuO}_{2} \text{C} = \text{N} - \text{CO_{2}Bu}}
\begin{array}{c}
\text{N} \quad \text{N} \\
\end{array}
\quad \xrightarrow{A (5 \text{ mol\%}) \\
\text{PhSiH}_{3} (1 \text{ equiv.}) \\
\text{EtOH, rt, 1 h} \\
94\%}
\begin{array}{c}
\text{Boc} \quad \text{N} \quad \text{NHBoc} \\
\end{array}
\]

C–N Bond Formation
22 examples (yields 62-94%).

Direct conversion of alcohols to fluorides.

\[
\begin{array}{c}
\text{PBSF (2 equiv.)} \\
\text{NEt}_{3} (2 \text{ equiv.}) \\
\text{BnO-O-O-Ts} \\
\text{THF, rt, 6 h} \\
92\%
\end{array}
\quad \xrightarrow{\text{PBSF (2 equiv.)}}
\begin{array}{c}
\text{BnO} \quad \text{F} \\
\text{O} \\
\end{array}
\quad \xrightarrow{\text{PBSF (2 equiv.)}}
\begin{array}{c}
\text{O} \\
\text{Bz} \\
\end{array}
\quad \xrightarrow{\text{PBSF (2 equiv.)}}
\begin{array}{c}
\text{O} \\
\text{Bz} \\
\end{array}
\quad \xrightarrow{\text{PBSF (2 equiv.)}}
\begin{array}{c}
\text{O} \\
\text{F} \\
\end{array}
\]

PBSF = perfluoro-1-butanesulfonyl fluoride. 17 examples (yields 65-96%).
Titanocene-catalyzed cascade cyclization of epoxypolyenones.


The synthesis of natural occurring terpenoids with various carboxylic skeletons is described. 6 examples (yields 31–61%).

Synthesis of cyclic hydroxy ketones derived from enol ethers via a Sharpless asymmetric dihydroxylation.


Ni-catalyzed reductive cleavage and cross-coupling reactions of aryl sulfonamides with Grignard reagents. Reduction/sp²-sp² Coupling


Synthesis of substituted furans via a phosphine-mediated reductive condensation of γ-acyloxy butyrones. Heteroannulation


Palladium-catalyzed arylation of trimethylsilyl enolates of esters and imides. C-C Bond Formation


Ring-closure reactions via intramolecular displacement of a phenylselenoyl group by nitrogen nucleophiles.


Nucleophilic Substitution

\[
\text{TBDPSO} - \text{OH} - \text{SOPh} + \text{BzH}^+ (1.1 \text{ equiv.}) \rightarrow \text{TBDPSO} - \text{O}\text{NH} - \text{Bz} \rightarrow \text{TBDPSO} - \text{O}\text{NBz}
\]

(a) mCPBA (4 equiv.)
K₂HPO₄ (5 equiv.)
THF, 0 °C, 2 h
(b) K₂CO₃ (5 equiv.)
(CH₂)₂CO, rt, 12 h
79%

32 examples (yields 44-89%).

Iminium salt catalysts for asymmetric epoxidation.

Asymmetric Epoxidation

\[
\text{A (0.5 mol%) Na₂CO₃ (4 equiv.) Oxone (2 equiv.) MeCN-H₂O (1:1), 0 °C, 2 h}
\]

65%
er = 95:5:4:5

26 examples (yields 0-70%, %ee 0-95%).

Catalytic, asymmetric bromination and chlorination of l-keto esters.

Asymmetric C–Hal Bond Formation

\[
\text{A (10 mol%) Cu(OtBu)₂ (10 mol%) NCS (1.2 equiv.) Et₂O, rt, 17 h}
\]

98%
er = 4:1

\[
\text{A (10 mol%) Cu(OtBu)₂ (10 mol%) NBS (1.1 equiv.) dioxane, rt, 17 h}
\]

98%
er = 5:1

22 examples (yields 93-99%, %ee 30-82%).

Termination of Mn(II)-based oxidative cyclizations by trapping azides.

Radical Cyclization

\[
\text{Mn(OAc)₃} \cdot 2\text{H₂O (2.5 equiv.) Na₂\text{S} (5 equiv.) MeOH, 55 °C, 1.5 d}
\]

50%

\[
\text{H₂ (50 psi) 10% Pt/C EtOH, rt, 6 h}
\]

41%

9 examples (yields 8-78%).

Catalytic asymmetric acylation of (siloxy)nitirile anions.

Asymmetric Acylation

\[
\text{A (15 mol%) toluene, 45 °C, 3 d}
\]

84%
er = 91:9

10 examples (yields 70-93%, %ee 61-84%).

Microwave-assisted amination from aryl triflates without base or catalyst. 

An intramolecular organocatalytic cyclopropanation reaction.

Asymmetric direct aldol reaction assisted by water and a proline-derived tetrazole catalyst.

A mild method for the preparation of γ-hydroxy-α,β-acetylenic esters.

Catalytic, heterogeneous, enantioselective carbonyl- and imino-ene reactions using copper bis(oxazoline) zeolite Y. C=C Bond Formation

Cu-HY = Immobilized copper-zeolite Y catalyst. 14 examples (yields 23-92%, %ee 57-99%).
Cu-catalyzed electrophilic amination of diorganozinc reagents.

\[
\begin{align*}
\text{N-Obz} & \xrightarrow{\text{Cu(OTf)}_2 \cdot \text{C}_{6} \text{H}_{5}} \text{Zn} \\
\xrightarrow{(1.1 \text{ equiv.}) \text{THF, rt, 1 h}} \text{N} & \text{Me}
\end{align*}
\]

15 examples (yields 69-98%). Use of alternative copper salts is also reported.

Fe-catalyzed Grignard cross-coupling with alkyl halides possessing \(\beta\)-hydrogens.

\[
\begin{align*}
\text{MoBr} + (\text{CH}_2\text{Br})_2 & \xrightarrow{\text{Fe(ascO)}_2 (5 \text{ mol\%}) \text{Et}_2\text{O, 0.5 h}} \text{TiO} \\
& \xrightarrow{69\%} \text{MeO} \xrightarrow{(1 \text{ equiv.)}} \text{Ome}
\end{align*}
\]

5 examples (yields 92-98%).

Synthesis of aryl and vinyl azides via proline-promoted CuI-catalyzed coupling reactions.

\[
\begin{align*}
\text{PhI} & \xrightarrow{\text{CuI (10 mol\%), NaNH$_2$ (1.2 equiv.) \text{L-proline Na salt (20 mol\%) \text{DMSO, 70 °C, 4 h}} \text{70\%}} \\
& \xrightarrow{\text{Ph}} \text{N}_2 \\
\text{MeO} & \xrightarrow{\text{Cul (10 mol\%), NaNH$_2$ (2 equiv.) \text{L-proline (30 mol\%) \text{NaOH (30 mol\%) \text{EtOH-H$_2$O (7.3), 95 °C, 10 h}} \text{93\%}}}
\end{align*}
\]

30 examples (yields 9-93%).

Ni-catalyzed cross-coupling of aryl Grignard reagents with aromatic alkyl ethers.

\[
\begin{align*}
\text{NiCl$_2$(PC$_3$)$_2$ (5 mol\%) \text{PC$_3$ (11 mol\%) \text{p-TolMgBr (3.2 equiv.) \text{(EtO)$_2$CH$_2$, 95 °C, 15 h}} \text{99\%}}}
\end{align*}
\]

39 examples (yields 30-99%).

Aziridination/ Rearrangement

\[
\text{Et} \quad \text{Cu(MeCN)}_2\text{PF}_6 (10 \text{ mol%}) \\
\text{Pb}^+\text{NTs (1 equiv.)} \\
\text{MeCN, 0 °C, 1 h} \\
\longrightarrow \\
\text{Et} \quad \text{TsCNNa (1.2 equiv.)} \\
\text{NBS (20 mol%)} \\
\text{MeCN, rt, 1 h} \\
\rightsquigarrow \\
\text{44%} \\
\text{cis/trans = 1:1.6}
\]

9 examples (yields 42-99%).


Annulation

\[
\text{O} \quad \text{CO}_2\text{Et} \\
\text{Et} \quad \text{Ti(O-Me)}_2(1 \text{ equiv.}) \\
\text{C}_8\text{H}_{18}\text{MgCl (4 equiv.)} \\
\text{THF, rt, 5 h} \\
\longrightarrow \\
\text{O} \quad \text{OH} \\
\text{O} \\
\text{70%} \\
\text{cis/trans = 75:25}
\]

7 examples (yields 9-62%).

7 examples (yields 25-76%)


Annulation

\[
\text{CH}_2\text{Cl}_2, -78 \rightarrow 40 °C, 6 h \\
\text{90%}
\]

\[
\text{TBDPS} \\
\text{O} \\
\text{Ph} \\
\text{(1.3 equiv.)} \\
\longrightarrow \\
\text{TBDPS} \\
\text{n-Bu} \\
\text{O} \\
\text{Ph} \\
\text{(1.3 equiv.)} \\
\text{CH}_2\text{Cl}_2, -78 \rightarrow 40 °C, 6 h \\
\text{70%} \\
\text{cis/trans = 75:25}
\]

9 examples (yields 55-90%, cis/trans 57.43-96:5).


Asymmetric 1,2-Addition

\[
\text{Ph} \longrightarrow \text{H} (2 \text{ equiv.}) \\
\text{MeZn (1 equiv.)} \\
\text{A (22 mol%)} \\
\text{PhMe, rt, 20 h} \\
\text{90%} \\
\text{er = 94:5:5.5}
\]

19 examples (yields 61-90%, %ee 86-97%).


Asymmetric 1,4-Reduction

\[
\text{CuCl (0.5 mol%)} \\
\text{NaOMe (0.5 mol%)} \\
\text{A (0.4 mol%)} \\
\rightarrow \\
\text{79%} \\
\text{er = 98.7:1.3}
\]

PMHS = poly(methylhydrosiloxane). 8 examples (yields 88-96%, %ee 90-99.5%).