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Synthesis of chiral molecules: Batch vs flow chemistry

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In the synthesis of chiral APIs (active pharmaceutical ingredients) the use of continuous-flow systems is attracting increasing attention. Recently developed technology-assisted stereoselective reactions will be discussed, including reactions of nitroacrylates and catalytic metal-free catalytic reduction of imines to afford chiral, biologically active chiral amines. Some stereoselective transformations have been performed in chiral reactors (packed-bed and monolithic) under continuous flow conditions. Organocatalytic reactions in (micro)-mesoreactors will be also discussed, and compared with stereoselective catalytic in-flow reactions in 3D-printed reactors. The fabrication of ad hoc designed reactors and other devices, to perform at best different reactions becomes now feasible and gives the new impulse to the use of enabling technologies in the synthesis of complex molecules.



Recent Publications

1. R Porta, M Benaglia, R Annunziata, A Puglisi and G Celentano (2017) Solid supported chiral *n* picolyimidazolidinones: recyclable catalysts for the enantioselective, metal and hydrogen free reduction of imines in batch and in flow mode. *Advanced Synthesis & Catalysis* DOI: 101002/adsc201700376.

Synthesis & Catalysis DOI: 101002/adsc201700376.

2. D Brenna, R Porta, E Massolo, L Raimondi and M Benaglia (2017) A new class of low loading catalysts for highly enantioselective, metal free imine reduction of wide general applicability. *ChemCatChem* DOI: 101002/cctc201700052.
3. S Rossi, D Brenna, R Porta, A Puglisi and M Benaglia (2017) Stereoselective catalytic synthesis of active pharmaceutical ingredients in homemade 3d-printed mesoreactors. *Angewandte Chemie* 56(15):4290-4294.
4. V Dragone, V Sans, M H Rosnes, P J Kitson and L Cronin (2013) 3D-printed devices for continuous-flow organic chemistry. *Beilstein Journal of Organic Chemistry* 9:951-959
5. S V Ley, D E Fitzpatrick, R J Ingham and R M Myers (2015) Organic synthesis: march of the machines. *Angewandte Chemie* 54(11):3449-64

Biography

Maurizio Benaglia has completed his PhD in Organic Chemistry by Università degli Studi di Milano and Postdoctoral studies from University of California, San Diego (UCSD) under the supervision of Prof J Siegel. In 2001 he won the "Giacomo Ciamician" Medal of the Italian Chemical Society. In 2006 he was promoted to Associate Professor and in 2015 he became Full Professor of Organic Chemistry at the Department of Chemistry, University of Milan. He is an author of more than 180 publications on international journals, including four patents, ten review articles and nine book chapters (h index 43). He has been Editor of the Wiley book *Recoverable and Recyclable Catalysts* (2009).

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