

Stereochemistry

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Stereoselective synthesis of selected important nitrogen heterocycles

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Nitrogen-containing heterocyclic compounds are widely distributed in Nature and play important role in the metabolism often exhibiting interesting biological activity in humans. Also, many synthetic nitrogen heterocycles are highly relevant to pharmacology and medicine. Due to a widespread phenomenon of bio-stereodiscrimination in living organisms, the synthesis of such compounds should allow full control of the spatial arrangement of the created molecular framework.

Several strategies can be applied for this purpose, such as the use of chiral building blocks, chiral auxiliaries or chiral ligands in catalytic processes. In this overview we will present examples of stereoselective synthesis of isoquinoline and β -carboline alkaloids, as well as pharmacologically relevant heterocycles with the use of hydroxy or amino acids as chirality promoters.

Asymmetric transfer hydrogenation (ATH) has proven its utility in the stereoselective synthesis of tertiary amines and we extensively applied this protocol in the construction of different heterocycles using classic Noyori-type catalysts. Also, new effective ligands for ATH were synthesized from naturally occurring monoterpenes.

Recently we started to explore the enantioselective version of the Suzuki-Miyaura cross coupling reaction in the synthesis of chiral atropisomeric aryl-pyridines.

Some preliminary results of a stereoselective multicomponent reactions and chiral guanidine-based organocatalysts will also be presented.

Biography

Zbigniew Czarnocki obtained his Ph.D. degree from the University of Warsaw (Poland) in 1983. He obtained his habilitation degree (summa cum laude) in 1993 and in 2002 he became a full professor. From 1996 he is a leader of the Laboratory of Natural Products Chemistry. His research interest focuses on stereoselective synthesis of natural products, modern catalytic reactions and pharmacochemistry of various heterocyclic compounds. He graduated 18 Ph.D. students and has authored over 120 publications, 6 review articles, 2 book chapters and 6 patents. In 2012 he was appointed Dean of the Inter-Faculty Studies in Environmental Protection at the University of Warsaw.

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