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N-halo organic compounds as precatalysts for direct cross-coupling of alcohols with N-nucleophiles under mild reaction conditions

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The C-N coupling reactions display one of the essential implements in synthetic organic chemistry due to their various biological activities. Since alcohols are inexpensive, available, and could serve as alkylating agents, their direct cross-coupling with N-nucleophiles could be a desirable strategy from the perspective of green chemistry, avoiding an additional synthetic step for coupling reaction and producing water as only a by-product of the reaction. In order to manipulate a specific transformation of a hydroxyl moiety, often its activation is necessary. Activation of alcohols has been achieved using a substoichiometric amount of different catalysts, such as Brønsted acids, metals ions, Lewis/Brønsted acid combination, molecular iodine, or other supporters.However, the requirement of harsh reaction conditions or the use of expensive catalysts in many cases, environmentally undesirable solvents, toxic or expensive reagents makes such a method less attractive from the green chemical point of view. Regarding the environmental concerns and from an economic point of view, the use of metal-free, easy-handled, low-price catalysts and safer reaction media remains an attractive research challenge in modern synthetic chemistry. A group of organic molecules bearing an active N-halogen bond: N-halosuccinimides, (chloro, bromo, or iodo), 1-chloromethyl-4-fluoro-1,4-diazoniabicyclo[2.2.2]octane bis-tetrafluoroborate (SelectfluorTM F-TEDA-BF4), and N-fluorobenzenesulfonimide (AccufluorTM NFSi), are non-metal, inexpensive, commercially available reagents that are widely used in organic synthesis as oxidizing, hydroxyhalogenating, or halogenating agents and at natural compounds as well. In our continuous research on developing environmentally friendlier synthetic routes, we report N-halo organic compounds as metal-free and environmentally benign substoichiometric mediators for direct cross-coupling of various alcohols with N-nucleophiles under mild reaction conditions, enhancing the green chemical profiles of these transformations.

Biography

Njomza Ajvazi received her B.Sc. degree and completed her M.Sc. degree in Organic Chemistry with Biochemistry at the University of Prishtina "Hasan Prishtina", Kosovo. Her Doctor of Science degree in study programme: Nanosciences and Nanotechnology was conferred by Jožef Stefan International Postgraduate School, Ljubljana, Slovenia, in 2016, under the supervision of Professor Dr. Stojan Stavber. Currently, she is an Associate Professor at the Alma Mater Europaea Campus "REZONANCA", Kosovo. Her research interest is the development of new methodologies for comprehensive direct transformation of alcohols forming new C-C or C-heteroatom bonds under green reaction conditions.