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New approaches for green and cost-effective metal catalysis

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Metals play an important role as catalyst in organic synthesis and have been instrumental in many key transformations. Several noble and expensive metals such as platinum, gold, silver and palladium have been demonstrated to catalyze many important reactions. However, for better cost management and environmental concern use of less expensive and more environment friendly metals are desirable. Thus, the main focus of our group's activity is directed to benign and inexpensive metal catalyzed C-C and carbon-heteroatom bond formation leading to the synthesis of bioactive molecules. For example, we have developed a recyclable heterogeneous catalyst of Cu(II) anchored on Al₂O₃ surface that has been successfully used for several reactions. One of them is Cu(II)/Al₂O₃ catalyzed solvent controlled selective N-arylation of cyclic amides and amines leading to important scaffolds of potent therapeutic agents. We have also developed a novel concept of using two appropriate inexpensive metals in place of expensive metal like palladium and ligand, where one metal takes active part in catalysis and other one is assisting the process. Using this protocol copper-assisted nickel catalyzed ligand free C_{sp}-C_{sp} and C_{sp}-C_{sp2} cross-coupling providing a direct access to unsymmetrical 1,3-diynes and en-yne, and Co/Cu catalyzed C_(sp2)-O cross-coupling have been achieved among others, our another approach is to design metal free reaction which is traditionally mediated by metals. Thus, we have developed a visible light photocatalyzed direct conversion of aryl/heteroaryl amines to selenides at room temperature.

Biography

Brindaban C Ranu started his independent research career in 1985 at Indian Association for the Cultivation of Science, Kolkata, India after completing his PhD from Jadavpur University, India and Post-doctoral studies at Virginia Tech, USA. He has been promoted as Professor in 1996 and Senior Professor in 2006. Currently, he is INSA Senior Scientist and J C Bose National Fellow at the same institute. His primary research interest lies in green synthesis and green catalysis. He has published more than 257 papers in reputed journals with an H-index of 52. He is a Fellow of INSA and IASc.

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