

Minimizing the use of non-green polar aprotic solvents by rational design of catalytic systems

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Polar aprotic solvents are widely used in chemical synthesis due to their strong dipole properties, which can dissolve salts and stabilize reaction intermediates. However, most polar aprotic solvents are toxic, flammable, and explosive. Therefore, the replacement of polar aprotic solvents is one of the important tasks for green chemistry researchers. Our research group has developed ionic liquid materials with both dipole solvent function and catalytic function, such as nitro-functionalized ionic liquids and cyclic sulfone-functionalized acidic ionic liquids, using a catalyst and solvent integration strategy. The above ionic liquids have shown excellent performance in various transition metal catalyzed and acid catalyzed reactions, and can achieve the target reaction well without using polar aprotic solvents, providing a suitable alternative for the replacement of polar aprotic solvents [1-3].

Our research group has also used dipolar functional group-modified hypercrosslinked polymers as carriers, and achieved several acid-catalyzed and transition metal-catalyzed reactions in relatively green alcohol and ester media through the polar induction effect of dipolar fragments. With the aid of electron beam irradiation technology, our research group has also developed a universal method for the dipolar modification of solid acids, which has improved the acid catalytic performance of solid acids in ester solvents, avoiding the use of non-green polar aprotic solvents [4].

References

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BIO

Yanlong Gu obtained his PhD degree from Lanzhou Institute of Chemical Physics, Chinese Academy of Science under supervision of Prof. Youquan Deng. He started then a journey as post-doc researcher in the group of Prof. Shu Kobayashi, The University of Tokyo, Japan (one year), and the group of Prof. Francois Jerome, The University of Poitiers, France (two years). Since October 2008, Yanlong Gu become a professor in School of Chemistry and Chemical Engineering, Huazhong University of Science and Technology, Wuhan, China. He is also a vice director of Xinjing Technology Co. Ltd., Hubei Province, China, which is mainly dealing with the production of fine chemicals. Yanlong Gu has a broad interest in homogeneous catalysis, green organic synthesis, ionic liquids and functional materials for new energy chemistry. In the past decade, Gu has published more than 100 research papers, and contributed three book chapters in the fields. Yanlong Gu is a board member of some journals including Chinese Journal of Catalysis, and Industrial Chemistry & Materials.