

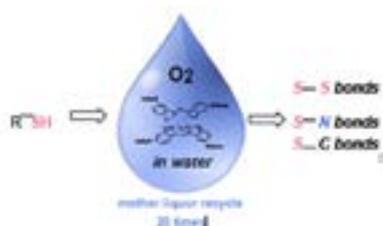
Reusable cobalt-phthalocyanine in water: Efficient catalytic aerobic oxidative coupling of thiols to synthesize organosulfur compounds

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Statement of the Problem: Organosulfur compounds have been vitally applied as synthetic intermediates and reagents in organic synthesis, pharmaceutical and biological science. Nevertheless, the shortcomings of traditional methods are apparent, including toxic organic waste, harsh reaction conditions (such as high temperature, long reaction hours, and risk of over-oxidation), extra additives or bases, and tedious work-up procedures. Therefore, the development of novel and green strategies that can be carried out under mild conditions for the synthesis of organosulfur compounds remains a challenge and is highly desired. In this contribution, we describe the catalytic aerobic oxidation of thiols to synthesize disulfides, sulfonamides and diaryl sulfides. A reusable cobalt-catalyzed aerobic oxidative coupling of thiols to produce disulfides and sulfonamides in water was studied, which utilizes environmentally friendly and naturally abundant O₂ as the oxidant.

Findings: The mother liquor could be recycled up to 20 times with negligible loss of activity and only a minor decrease of product yield. The same catalytic system was further extended to oxidative cross-coupling of naphthol/naphthylamine with thiols to form diaryl sulfides bearing a wide range of substituents in good to excellent yields.

Conclusion & Significance: These highly efficient and versatile methodologies offer interesting prospects for the commercial manufacturing of organosulfur compounds in a much greener and economical way.



Biography

Bingxin Yuan, PhD is an Assistant Professor of College of Chemistry and Molecular Engineering in Zhengzhou University since 2016. She pursued her PhD degree in organic Chemistry in USA and graduated in Aug, 2016. She started working in Zhengzhou University ever since. She has her expertise in novel organic synthesis and organic semiconducting materials synthesis and characterization. Her work aim to address the challenges of organic synthesis in a greener way: design and study of green catalysis with unique chemical properties. Her main research fields contain the radical and oxidative reaction as novel synthetic tools that are non-hazardous and environmentally friendly for manufacture of chemicals.

Guanyu Yang is a Professor in College of Chemistry and Molecular Engineering, Zhengzhou University, China, since 2006. He received his Ph.D. of chemistry in 2005 from Dalian Institute of Physical Chemistry, Chinese Academy of Sciences. His research interests center around the development of new synthetic methodologies, and the more environmentally benign processes for the synthesis of higher added-value chemicals. For this aim, his research directs towards the fundamental and applicable investigations of various catalytic techniques, involving organo-, biomimetic, heterogenous, and homogenous catalysis, as well as the interdisciplinary approach. Much of his work is devoted to the development of novel synthetic methods via the catalytic oxidation with molecular oxygen as a terminal oxidant.

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