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Extraction of lignocellulose and synthesis of porous silica nanoparticles from rice husks– A comprehensive utilization of rice husk biomass

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Rice husk (RH) biomass is a massive byproduct from rice milling. Applications of RHs have been very limited. Therefore, RHs are often considered as a biowaste. RHs are mainly composed of lignocellulose (ca. 72-85 wt %) and silica (ca. 15-28 wt %). Majority of previous explorations focused on the preparation of silica or other silicon based materials from RHs, while the lignocellulose in RHs was usually burnt and thus wasted. Herein, an approach for comprehensive utilization of RHs has been developed to obtain both lignocellulose and high quality porous silica nanoparticles from RHs. Most of the lignocellulose in RHs was firstly extracted by dissolving in ionic liquids. The dissolved lignocellulose was subsequently separated and collected. The remaining RH residue after extraction that contains a high concentration of silica was thermally treated to synthesize amorphous porous silica nanoparticles with a high purity and surface area. It was also found that during the extraction of lignocellulose using ionic liquids, some metal cations (e.g. K^+) that generate negative effect for the synthesis of silica can be removed simultaneously, which generates a synergy for this comprehensive approach to make full use of RH biomass. The implication of the present findings is discussed.

Biography

Haoran Chen is studying in a Ph.D. program in Materials Science, Engineering, and Commercialization Program at Texas State University-San Marcos. Jarett C. Martin, Adam J. Oliphant, Paige A. Doerr, Katelyn M. DeBorn, Jeffery F. Xu are undergraduate students at Texas State University-San Marcos. Hong Wang is an undergraduate student at South China University of Technology-Guanzhou China.

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