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Synthesis of organosilicon complexes from rice husk derived silica nanoparticles

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Organosilicon compounds are a group of important materials with widespread applications. However, their synthesis has been relying mainly on the carbothermal reduction of silica to silicon and subsequent reaction between silicon and alkyl or aryl chloride. This multi-step approach involves high temperature, high pressure, and strong acidity, which is energy-intensive, expensive, and eco-hazardous. An alternative approach was explored to synthesize organosilicon complexes via a green chemical process using silica nanoparticles derived from rice husk (RH) biomass as the starting material. By controlling the pre-treatment of RHs and pyrolysis conditions, silica samples with various surface areas and levels of crystallinity were synthesized. Such silica can be converted to silicon complexes via a low temperature approach. The synthesized silicon complexes were characterized by 1H, 13C, 29Si nuclear magnetic resonance and elemental analysis. Overall, the biogenic silica nanoparticles with high surface area and low crystallinity exhibit high reactivity. Thanks to their high reactivity and low cost, such biogenic silica nanoparticles from RHs can serve as an ideal starting material for producing organosilicon complexes.

Biography

Luyi Sun received his Ph.D. from The University of Alabama in 2004 and conducted his postdoctoral studies at Texas A&M University. In 2006, Dr. Sun joined TOTAL Petrochemicals USA, Inc. as a senior research engineer. In 2009, Dr. Sun moved to Texas State University. Dr. Sun has authored over 50 papers in peer-reviewed journals, two book chapters, and delivered over 60 talks at national/international conferences. He is credited for 25 US/International Patents or Patent Applications. Dr. Sun currently serves as an editorial board member of *Journal of Plastic Film and Sheeting* and *Dataset Papers in Materials Science*.

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