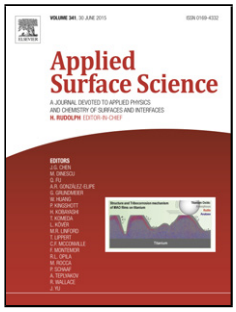

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<AT>Mesoporous poly(ionic liquid) supported palladium(II) catalyst for oxidative coupling of benzene under atmospheric oxygen

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Highlights►

<ABS-Head><ABS-HEAD>Graphical abstract
<ABS-P>
<ABS-P><xps:span class="xps_Image">fx1</xps:span><ABS-HEAD> ► Highlights ► Heterogeneous catalysis for benzene coupling under atmospheric O_2 is constructed. ► Novel mesoporous poly(ionic liquid) is designed for anchoring Pd(II) sites. ► The catalyst exhibits higher activity than the homogeneous counterpart.

<ABS-HEAD>Abstract
<ABS-P>Multi-functional mesoporous poly(ionic liquid) (MPIL) containing pyridine-based ionic liquid (IL) moieties and adjacent double –COOH groups was synthesized through the free radical copolymerization of IL monomer N-propane sulfonate-4-vinylpyridine, maleic anhydride and divinylbenzene. Palladium(II) species were anchored on this MPIL support, affording the first efficient heterogeneous catalyst for the oxidative coupling of benzene to biphenyl under atmospheric oxygen at low temperature. The biphenyl yield of 15.0% (selectivity: 98.5%, turnover number: 62) was even higher than the one over the homogeneous counterpart palladium acetate. The catalyst can be facilely separated and reused. The IL moiety in the polymeric framework endowed the formation of immobilized palladium(II) species with high electrophilicity, which responds to the high performance.

<KWD>Keywords: C−C coupling; palladium catalysis; poly(ionic liquid); aerobic oxidation;

heterogeneous catalysis; polyoxometallate

<H1>1. Introduction
Noble-metal catalysts are extensively used in many fields such as the petrochemical industry, pharmaceuticals production, environmental protection and new energy, due to their irreplaceable performance and high activity [1,2]. Heterogeneous catalysis is known to be more environmental benign and efficient by benefiting the convenient catalyst isolation/reuse and product separation [3]. However, heterogeneous noble-metal catalysts usually suffer from the inferior activity to the homogeneous counterpart. Many of them were performed under harsh reaction conditions of high temperature and pressure [4,5]. This problem becomes serious in the catalysis system involving inert substrates, rendering the great challenge to fabricate target efficient heterogeneous noble-metal catalysts to fulfil the increasing demand for green and sustainable development. This is exemplified by the fact that rare heterogeneous noble metal catalysts were fabricated for the aerobic oxidative