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Novel catalytic transformations of ionic polymer-supported palladium metal nanoparticle compounds

Metal nanoparticles are increasingly used in catalysis due to their high surface area and increased density of surface active sites compared to bulk metal.1 Ionic liquids have been shown to stabilized nanoparticles towards aggregation and also, in some cases, to enhance the catalytic activity or selectivity.2 In this project cross-linked ionic copolymers were prepared by radical polymerisation of imidazolium-functionalised styrene monomers together with styrene carrying a neutral pyrrolidinone derivative designed to interact with metal nanoparticles. The ionic polymer was loaded with $PdCl_4^{2-}$ by anion exchange and then hydrogenation produced a Pd (0) loaded polymer which was characterized by TEM, microanalysis, ICP-OES, XPS, XRD, and SEM. These palladium-immobilised ionic polymer-supported nanoparticles were demonstrated to be active catalysts for Suzuki cross coupling reactions, and we will explore the efficiency of palladium nanoparticles in a broader range of reactions including the selective hydrogenation of α, β-unsaturated aldehydes and ketones as well as the decompositions of formic acid to CO2 and H2.

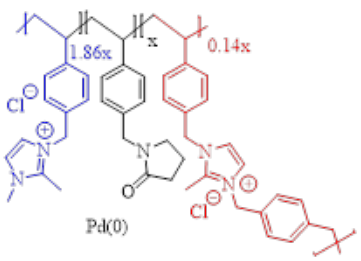
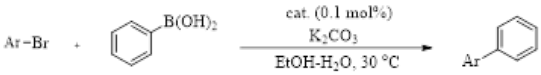


Figure1: The structure and SEM image of the palladium loaded ionic polymer.



Scheme 1: The general conditions for Suzuki coupling.

Speaker Biography

Hind A has completed her PhD in 2019 from Newcastle University, UK. She is the Assistance professor at Newcastle University, SA. She has over 12 publications that have been cited over 46 times.

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