Polyaniline Supported Autoreduced Metal Nanoparticles for Catalysis

Yilei Wu, Robert W. Kojima and Richard B. Kaner

Department of Chemistry, University of Perugia (Italy)

and

Department of Chemistry and Biochemistry, UCLA

Polyaniline, a well-known conducting polymer, has the ability to spontaneously reduce various metal cations due to its unique redox properties. The simple addition of palladium(II) nitrate to pre-synthesized dedoped polyaniline nanofibers autoreduces the metal salt to palladium metal forming nanoparticles. This composite material has been shown to be an active catalyst for the Suzuki coupling between aryl chlorides and aryl boronic acids in water and air. In this work we will examine the parameters that control its efficiency. We investigated the effects of sonication, stirring, addition of salt, and type of bases during the coupling reaction. We also examined the different synthetic methodologies of the catalyst itself and how factors such as choice of dedoping agents and differing oxidation states affect the efficacy of our catalyst. The products and catalysts were characterized by NMR, UV-Vis, TEM and SEM in order to understand the relationship between the metal and its polymeric support.

The most interesting result suggests that the stirring and the simple addition of sodium chloride tremendously affects the product conversion. The new optimized conditions we developed have remarkably enhanced this advantageous catalyst. Further understanding will assist in tuning these and future composite catalysts systems for improved yields and applicability in other systems.

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