

RESEARCH PAPER

Efficient Suzuki and Sonogashira coupling reactions catalyzed by Pd/DNA@MWCNTs in green solvents under mild conditions

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ABSTRACT

he palladium nanoparticles were immobilized on DNA-modified multi walled carbon nanotubes as stable and powerful heterogeneous catalyst. The catalyst was characterized by FT-IR spectroscopy, UV-Vis spectroscopy, field emission scanning electron microscopy, X-ray diffraction, transmission electron microscopy, inductively coupled plasma and elemental analysis. DNA as a well-defined structure and biodegradable natural polymer was used to make the palladium catalyst which shows a high activity in Suzuki and Sonogashira cross-coupling reactions in excellent yields and good selectivity under ligand-free and mild reaction conditions. Moreover, the catalyst could be recovered and reused several times without any considerable loss of its catalytic activity. This air- and moisture-stable phosphine-free palladium catalyst was found to be highly active in aqueous ethanol with extremely small amount of palladium under mild conditions. To the best of our knowledge, this is the first report on using DNA base heterogenous catalyst for Suzuki and Sonogashira cross-coupling reactions.

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2. Characterization of catalyst

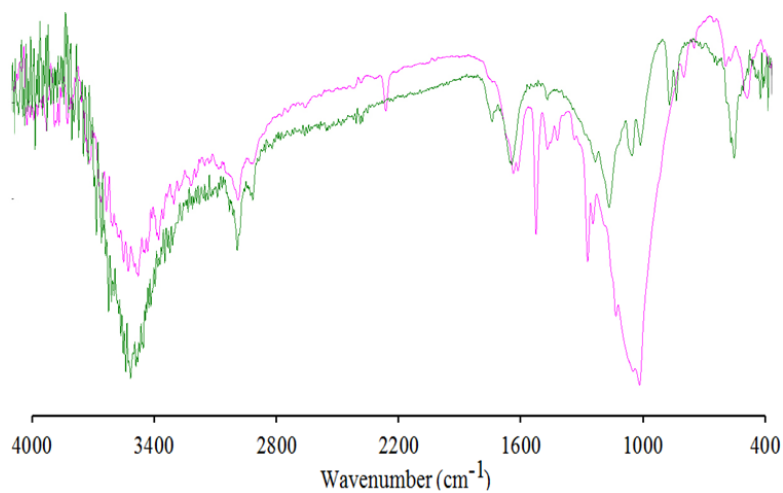


Fig. S1 The FT-IR spectra of MWCNT-COOH (green) and Pd/DNA@MWCNTs (pink)

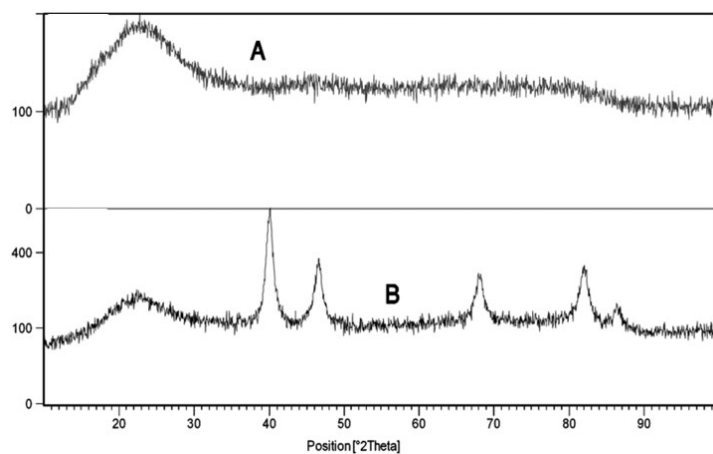


Fig. S2 XRD pattern of the MWCNTs up (A) and Pd/DNA@MWCNTs down (blue)

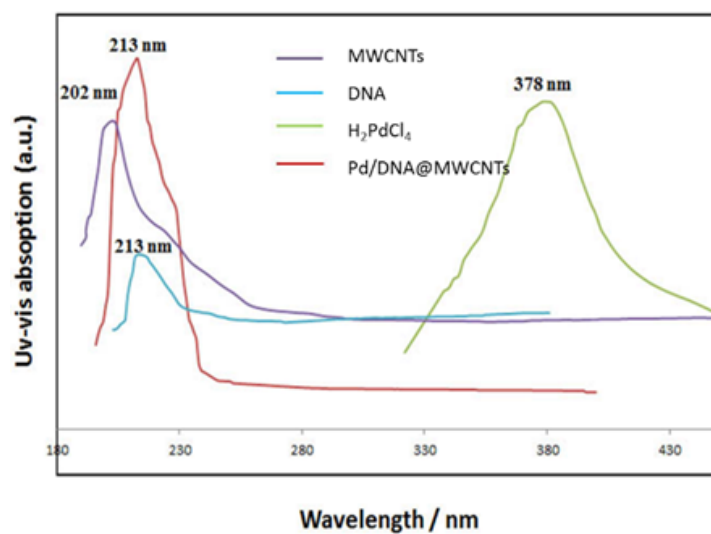


Fig. S3 UV-vis absorption of MWCNT-COOH (violet), DNA (blue), H_2PdCl_4 (green), Pd/DNA@MWCNTs (red).

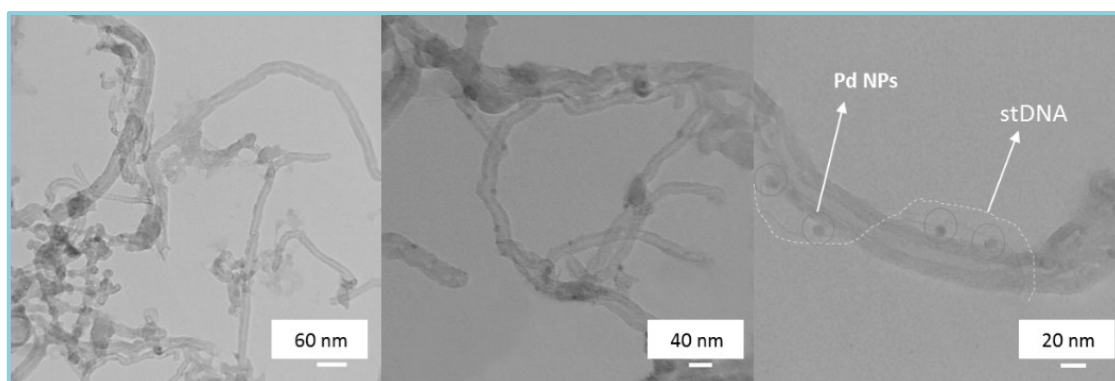


Fig. S4. TEM images of Pd/DNA@MWCNTs

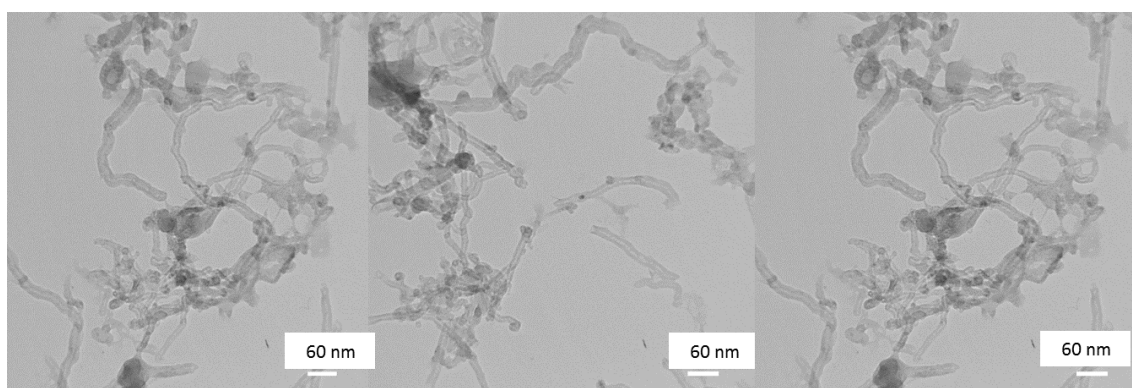


Fig. S5. TEM image of Pd/DNA@MWCNTs recovered after nine run.