Palladium nanoparticles supported on alumina-based oxides as heterogeneous catalysts of the Suzuki-Miyaura reaction.

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Streszczenie

Alumina-based oxides Al_2O_3, Al_2O_3–ZrO_2 (A, B, C) and Al_2O_3–ZrO_2–Eu_2O_3 (D) were prepared by alkoxide sol–gel method and used as supports for palladium nanoparticles obtained by reduction of $PdCl_2$ by methanol or hydrazine. As confirmed by XRD and TEM methods, such catalysts are composed of palladium nanoparticles well dispersed on the surface of the alumina matrix. The Suzuki coupling of 2-bromotoluene with phenylboronic acid, used as the test reaction, revealed that the obtained catalysts were quite efficient even at 40 °C and that their catalytic activity increased at 60 and 80 °C. Very good results (95% yield after 1 h) also were obtained when $PdCl_2$ supported on mixed oxides was used without earlier palladium reduction. It was confirmed that under the reaction conditions, Pd(0) nanoparticles of ca. 5 nm in diameter were formed on the support. Under the same conditions (^{i}PrOH + H_2O used as a solvent, KOH as a base), a Pd(0)/PVP colloid exhibited slightly lower catalytic activity.

Słowa kluczowe

Suzuki–Miyaura reaction, Nanostructured alumina–zirconia, palladium nanoparticles, Metal colloid, Supported palladium

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