PS-PAr₃ Hybrid: Metal Complexation and Catalytic Applications

Significance: The polystyrene triarylphosphine hybrid 1 was prepared by radical emulsion polymerization of 4-tert-butylstyrene, divinylbenzene, and tris(4-vinylphenyl)phosphine (eq. 1). The cross-coupling of aryl chlorides with phenylboronic acid and amines in the presence of Pd–1 complexes, generated in situ, gave the corresponding coupling products (eqs. 2 and 3). Supported phosphine 1 was also effective for the iridium- or rhodium-catalyzed borylation of C(sp³)–H bonds to afford the corresponding borylated products (eqs. 4–6).

Comment: PS-PAr₃ 1 was characterized with ¹³C and ³¹P CP-MAS NMR. In the Suzuki–Miyaura cross-coupling of 4-chlorotoluene with phenylboronic acid, the catalyst was recovered by simple filtration and reused with a decrease in catalytic activity (1st use: 91% yield, 3rd use: 94% yield, 4th use: 85% yield, 5th use: 70% yield, 6th use: 47% yield, 7th use: 24% yield). After the third reuse, TEM analysis of the recovered catalyst showed the aggregation of palladium metal.