

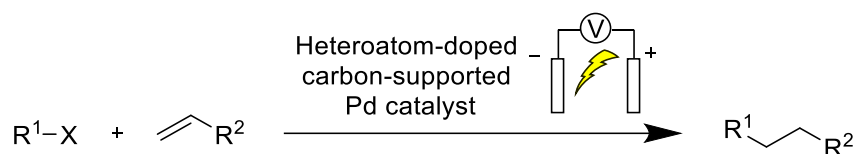
## Development of Electrochemical Coupling Reaction Using an Electrode of Doped Carbon-Supported Pd Catalyst

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Metal nanoparticle catalysts have gained attention as promising heterogeneous catalysts because of their unique activity and selectivity. Especially heteroatom-doped carbon-supported catalysts are useful for their robustness derived from the interaction between heteroatom-dopant and metal nanoparticles to prevent metal leaching.<sup>1)</sup> Though heteroatom-doped carbon-supported metal catalysts have been extensively studied in the field of electrochemistry, their applications to electrochemical organic synthesis are limited.

Coupling reactions with palladium catalysts are essential C–C bond formation reactions. However, they require ligands to activate metal species or reactive substrates such as iodides or bromides. Recently, it was reported that reactivity of a substrate could be electrochemically controlled by immobilization of the substrate on an electrode.<sup>2)</sup> The literature inspired us to control activity of metal species immobilized on electrodes by electricity, which would enable chlorides to be used for coupling reactions. We examined coupling reactions under electrochemical conditions with electrodes of heteroatom-doped carbon-supported Pd catalysts. Less reactive carbon–halogen bonds could be activated by applying electricity and reductive Heck-type reactions proceeded in the presence of olefins.



1) Beller, M. *et al. Angew. Chem. Int. Ed.* **2016**, 55, 12582.

2) Heo, J. *et al., Science* **2020**, 370, 214.