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NANOSTRUCTURED PALLADIUM-PEROVSKITES: INTERESTING "RELEASE AND CATCH" CATALYTIC SYSTEM IN CROSS-COUPLING CHEMISTRY

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Although the use of palladium and related transition metal catalysts in organic synthesis is ubiquitous, the presence of residual metals in the organic products is problematic, especially in the case of pharmaceutical compounds. In addition, high cost of palladium makes its recovery and reuse highly desirable. Hence, good heterogeneous candidates have to be assessed in terms of their activity and selectivity, metal leaching resistance and considering catalyst lifetime and reusability.

Perovskite based materials are interesting carriers to host palladium catalysts.[2] With an enhanced tolerance factor of 0.9 (Goldschmidt factor), they are able to stand harsh basic conditions necessary for coupling chemistry. This specificity makes them valuable candidates to substitute the omnipresent Pd supported on charcochal (Pd/C) and Pd supported on silica based materials (Pd/SiO_2).[3]

In our attempts to address this issue, $LaFe_{0.57}Co_{0.38}Pd_{0.05}O_3$ perovskite-type oxide catalyst has been synthesized via flash combustion and co-precipitation methods. Both materials were investigated in terms of their structural and textural properties. Depending on the synthetic pathway, amorphous or crystalline materials with different particle sizes were obtained. The catalytic activity of these systems was investigated in Suzuki-Miyaura and Sonogashira cross-coupling reactions. Mechanistic studies demonstrate that the materials operate following "release and cath" mechanism. "Ingress and Egress" of palladium in perovskite systems[4] constitutes a driving force for the preparation of new chemicals with low metal contamination.