●FY2011 Hiroshi Kitagawa（Professor, Kyoto University）

A Creation of Novel Function Materials Based on Inter-Elements Fusion.

Research Project Outline (From Oct. 2011 to Mar. 2017)

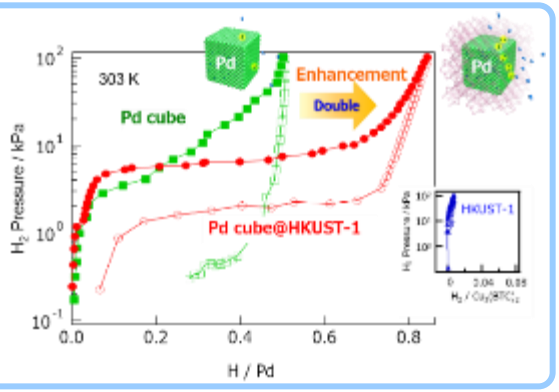
Creation of novel homogeneous solid-solution alloy nanoparticles of metals, which are immiscible with each other in the equilibrium bulk, and development of innovative materials on the basis of the inter-element-fusion strategy

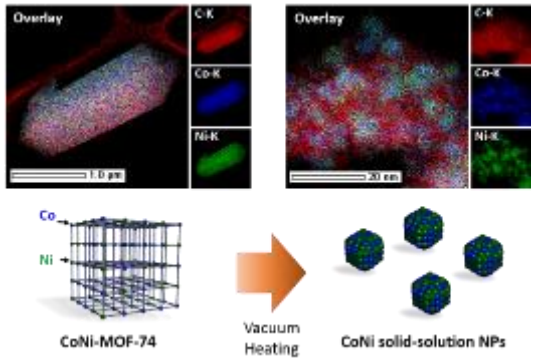
Research Results (FY2014)

◆ Remarkably enhanced hydrogen-storage capacity and speed in Pd nanocrystals covered with metal–organic framework

・We have synthesized and characterized novel Pd nanocrystals covered with $Cu_3(BTC)_2$ metal–organic framework. The Pd nanocubes in $Pd@Cu_3(BTC)_2$ could absorb almost twice the amount of hydrogen compared with bare Pd nanocubes. In addition, $Pd@Cu_3(BTC)_2$ exhibited excellent kinetic properties for hydrogen storage by the $Cu_3(BTC)_2$ coating on the surface of Pd.

Nature Materials, 13, 802-806 (2014).



◆ Development of new synthetic method for solid-solution alloy NPs

・ Solid–solution nanoparticles were successfully synthesized using the thermal decomposition of solid–solution metal–organic frameworks (MOF). The solid–solution nanoparticles were several nanometers in size. Furthermore, the size can be precisely controlled at a single– nanometer level by adjusting the heating conditions.