

## Fabrication of Nano-structured Ni Metal for Use as a Catalyst in Hydrogenation Reaction

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### Extended Abstract

The organized materials have extensive potential in many applications over the last decade[1-4]. Particularly nano-structured materials with a transition-metal or oxide framework could be used as catalysts and electrode materials because of their unique properties. Despite considerable progress in the field of porous solid synthesis, many challenges still remain in the fabrication of ordered structures with high metal content. Metals with two- or three-dimensional nanostructures may be expected useful in some applications such as catalysis. Recently ordered mesoporous metal replica could be fabricated using ordered mesoporous silica as a mold [5]. For the preparation of ordered nanostructure arrays by replication, a hard template has some advantages when compared with a soft template, especially in its specific topological stability, veracity, predictability, and controllability. The mesoporous silica materials have drawn more attention because of their uniform pore channels, large surface area, and large pore volumes, which make them perfect candidates to serve as a hard template. For selective applications of metals in hydrogenation catalysis, the potential would be maximized when the metals have high crystallinity and surfaces [6].

In this study, the nanowire type porous metals as a pure material or alloy of Ni-Co were synthesized by casting nano size method using mesoporous silicas as a mold. The cylinder type mesopore channels of SBA-15 were deposit with Ni, Co salt (or mixed salt for alloy) solution, which was then converted to metal oxide and treated 600°C. They were reduced to their corresponding metal by H<sub>2</sub> treatment at 350°C. The connected porous bundles of nano wire and the separated single metal wire were also fabricated in a simple manner after dissolution of silica mold by NaOH solution, and H<sub>2</sub> treatment. The structure of metal nano wires were characterized by TEM and XRD analysis. Those metal wires displayed well developed crystalline phases, and they could be applied as an efficient metal catalyst for the hydrogenation of organic compounds such as benzaldehyde and benzonitrile.

These nano wire type metals were employed as catalysts in the reduction of benzaldehyde and cyanobenzene to evaluate their catalytic activities. In the catalytic reduction, the nano wire type metals may be expected a higher activity than bulk metal.” “

**Keywords:** Nanostructures, Hydrogenation catalysis, Alloys, Metals, Nanomaterials, Organic compounds.

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