B2-1
Development of nanostructured materials for hydrogen storage

In this research, the efficient and mass storing technologies of hydrogen will be developed by using nanostructured materials.
- Synthesis of inorganic nanostructured materials intercalated with lithium, alkaline, or transition metal
- Structure control and active-site establishment for hydrogen storage of porous nanomaterials using block copolymer or electrochemical method
- Establishment of high-integration and light-weight technique of porous nanostructured materials

Goal

Synthesis and development of hydrogen storage in the porous nanostructured materials with 4 wt% capacity at room temperature and 100 atm

- Intercalation of selective functional element or alkaline metal ion
  - Development of synthetic method for optimized nanomaterials (stability of above 100℃, minimum storage capacity of above 4 wt%)
  - Improvement of crystal structure and hydrogen adsorption-site of nanostructured materials
  - Improvement of active site for hydrogen through induction of physical property conversion within lattice
- Synthesis and mechanism definition of nanomaterials through structure control
  - Development of nanostructured materials with hydrogen storage capacity of above 4 wt%
  - Mechanism definition of hydrogen adsorption/desorption through computational modeling
  - Temperature range : -50℃ - 100℃, pressure range : 1 - 100 atm

Objective

- 1st year
  - Synthesis of intercalated-Li ion inorganic nanomaterials selection of optimized material for the porous hydrogen storage material and morphology control
  - Synthesis of organic or inorganic nanotemplate
  - Control of nanomaterials morphology via kind of surfactant
- 2nd year
  - Control of nanomaterials morphology using hydrothermal or template
  - Mechanism definition of hydrogen adsorption/desorption through computational modeling
  - Synthesis of porous nanostructure using organic or inorganic nanotemplate
- 3rd year
  - High integration of porous nanomaterials
  - Synthesis of organic-inorganic hybrid block copolymer
  - Selection of optimized nanostructure for high-efficient hydrogen storage
- 4th year
  - Proposal and definition of mechanism for high-efficient hydrogen storage
  - Possession of light-weight technology for hydrogen storage material
  - Synthesis of high-efficient hydrogen storage nanomaterials under room temperature and 100 atm condition (4 wt%)

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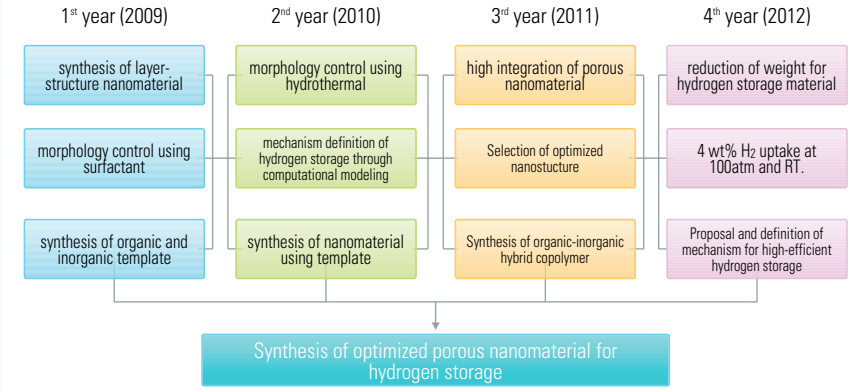
Researchers : 45 persons (National Institute 10, Univ. 35)

Strategy



Outcomes & benefits

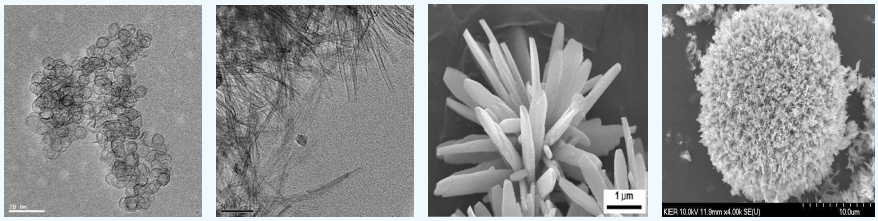
- Fundamental technology of nano-based high-efficient hydrogen storage nanomaterials
- Establishment of technology exportation of high-efficient hydrogen storage porous nanomaterials
- Establishment of suppling system of technical-leading eco-energy
- Improvement of life quality with advent eco-energy age
- Establishment of domestic foundation of hydrogen-storage technology for future clean energy

Publications (2nd stage)

Patent		Theses							Proceedings		
		domestic			foreign			total sum			
domestic	foreign	SCI	Non SCI	sum	SCI	Non SCI	sum		domestic	foreign	sum
5/3	5/0	1	1	2	17	0	17	19	4	6	10

- Publications

1. Hae Jin Kim et al, "Mn Quinonoid Core-Rh Quinonoid Shell Organometallic Nanospheres as Atom Economical Semiheterogeneous Catalysts in Carbene Transfer Reactions", Adv. Mater., 19, 2547-2551, 2007.4
2. Hae Jin Kim and Jin Bae Lee, "Method for Manufacturing Manganese Oxide Nanotube or Nanorod by Anodic Aluminum Oxide Template", 2008-537588(Japan), 06799352.7(Europe), 12/084103(USA).



SEM, TEM of nanostructured materials