

## B2

# 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
- Establishment of high-integration and light-weight technique of nanostructured materials
- Examination of mechanism in hydrogen sorption/desorption
- Standardization of measurement in hydrogen storage

### Goal

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

- Establishment of optimum synthesized condition in nanostructured materials
- Examination of mechanism in hydrogen sorption/desorption based on theory
- Standardization of H<sub>2</sub> sorption/desorption & database on nanostructured materials
  - Temperature range : -50°C - 100°C, pressure range : 1 - 100 atm

### Objective

- 1st year
  - Synthesis of intercalated-Li ion inorganic nanomaterials
  - Examination of mechanism in hydrogen sorption/desorption
  - Database on hydrogen storage materials
- 2nd year
  - Control of nanomaterials morphology using hydrothermal or template
  - Measurement of hydrogen storage in new materials
  - Precision of measuring equipment and database
- 3rd year
  - High integration of porous nanomaterials
  - Selection of optimized nanostructure for high-efficient hydrogen storage
  - Evaluation of measuring system and realization of control program
- 4th year
  - Proposal and definition of mechanism for high-efficient hydrogen storage
  - Possession of light-weight technology for hydrogen storage material
  - Synthesis of nanostructured material with 4 wt% H<sub>2</sub> storage



## Hae Jin KIM

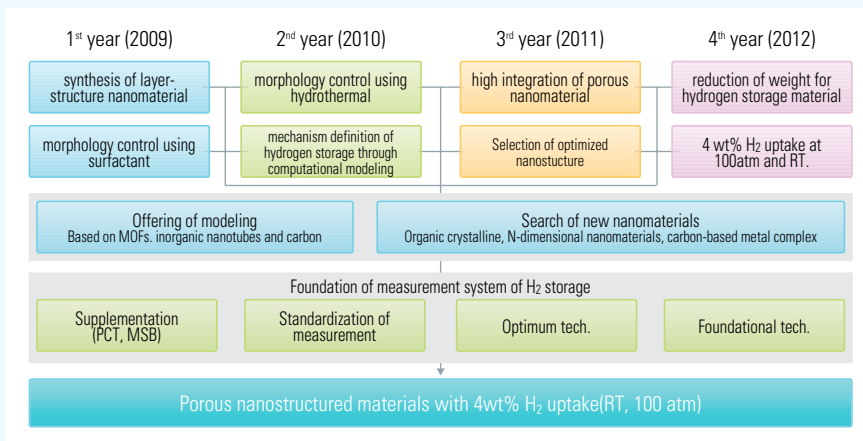
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Participants : KBSI, Insilicotech Co. Ltd., KIER, Chungnam Univ., Dankook Univ., Inha Univ.,  
POSTECH, KAIST, KRISS, Soongsil Univ., Sungkyunkwan Univ.

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

## Strategy



## Outcomes & benefits

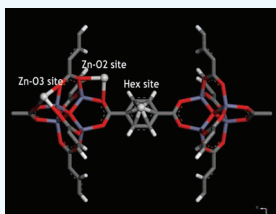
- Fundamental technology of nano-based high-efficient hydrogen storage nanomaterials
- Saving time and cost for the development of new materials by using molecular modeling
- Standardization of measuring system in hydrogen storage materials
- Understanding of research trend using database on hydrogen storage materials

## Publications (2nd stage)

Patent		Theses							Proceedings		
		domestic			foreign			total sum			
domestic	foreign	SCI	Non SCI	sum	SCI	Non SCI	sum		domestic	foreign	sum
9/3	8/0	3	1	4	28	3	31	35	25	32	57

### ■ 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.
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).



Insertion of metal atom in MOF



Gravimetric sorption system



Volumetric sorption system