

## B3-1

# Improvement of hydrogen storage capacity and demonstration of chemical hydrogen storage system

Chemical hydrogen storage offers options with high energy densities and potential ease of use. This study aims at development of compact hydrogen storage system using sodium borohydride (SBH,  $\text{NaBH}_4$ ) and ammonia borane (AB,  $\text{NH}_3\text{BH}_3$ ). The hydrogen storage system will be effectively used in fuel cell power pack for portable or mobile applications including unmanned aerial vehicle (UAV).

## Goal

### Improvement of hydrogen storage capacity and demonstration of chemical hydrogen storage system combined with small fuel cell

- Improvement of hydrogen storage capacity
  - Hydrogen storage density > 4.5 wt% (system basis)
- Demonstration of hydrogen storage system combined with small fuel cell
  - Continuous operation of 100 W fuel cell system > 10 hours
- Development of fundamental technology for unmanned aerial vehicle powered by fuel cell system

## Objective

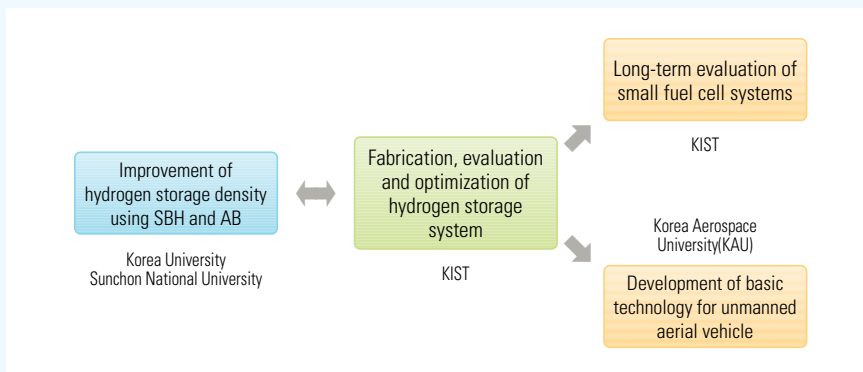
- 1st year
  - Hydrogen storage density > 3.0 wt% (system basis)
  - Continuous operation of 100W fuel cell system > 6 hours
  - Improvement of storage density using concentrated solutions of SBH and AB
  - Development of hydrogen storage system based on solid AB
- 2nd year
  - Hydrogen storage density > 3.5 wt% (system basis)
  - Continuous operation of 100 W fuel cell system > 8 hours
  - Development of water recovery and recycling technology
  - Simplification of hydrogen storage system
- 3rd year
  - Hydrogen storage density > 4.0 wt% (system basis)
  - Continuous operation of 100 W fuel cell system > 10 hours
  - Development of hydrogen storage system based on SBH and AB
  - Optimization of hydrogen storage system combined with small fuel cell
- 4th year
  - Hydrogen storage density > 4.5 wt% (system basis)
  - Continuous operation of 100 W fuel cell system > 10 hours
  - Application of hydrogen storage system for mobile fuel cell power pack
  - Enhancement of durability of hydrogen storage system



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 Researchers : 39 persons (National Institute 24, Univ. 15)

Strategy



Outcomes & benefits

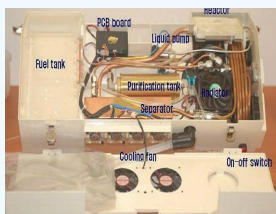
- Realization of chemical hydrogen storage system having storage density higher than 4.5 wt%
- Commercialization of small fuel cell power pack with chemical hydrogen storage system for portable or mobile applications
- Development of fuel cell systems for unmanned aerial vehicle

Publications (2nd stage)

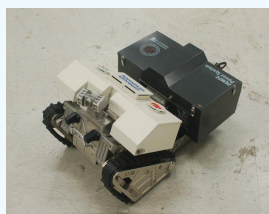
Patent		Theses							Proceedings		
		domestic		foreign			total sum	domestic	foreign	sum	
domestic	foreign	SCI	Non SCI	sum	SCI	Non SCI					sum
7/4			1	1	6		6	7	9	8	17

■ Publications

1. S.J. Kim, J.Y. Lee et al., "Hydrogen generation system using sodium borohydride for operation of a 400W-scale polymer electrolyte fuel cell stack", Journal of Power Sources, 170 (2007) 412-418.
2. J.Y. Lee, S.W. Nam et al., "A porous structured Co-B catalyst for hydrogen generation using borohydride solution", Korean Patent 0785043, 2007-12-05.



SBH hydrogen storage system (KIST)



A robot ROBHAZ equipped with SBH hydrogen storage system (KIST)



A small UAV equipped with hydrogen storage system (KAU)