

## Full-time professors of the International Research Center of Hydrogen Energy

Young researchers selected from international applicants were assigned as full-time faculty in April 2011 at the International Research Center of Hydrogen Energy.



### Advanced Device Research Division

**Akari HAYASHI** (Professor)

- **Affiliation :**  
International Research Center for Hydrogen Energy
- **Academic Degree :**  
**Ph.D.**
- **Professional Field :**  
Fuel Cells, Material Science, Electrochemistry

#### ● Main Research Topic

Development of fuel cells by controlling the material nano-structure  
—Electrocatalysts with controlled nano-space as a reaction site—

We have been working on fuel cells, which directly convert chemical energy to electricity without burning fossil fuels, for the future sustainable society. Syntheses of electrocatalysts through controlling their nano-structure, evaluation of

performance and durability as a fuel cell device, and investigation of their degradation mechanism are particularly focused on.

#### ● Division Outlook

Our division has been focusing on development of next generation fuel cells. Polymer electrolyte fuel cells operating over 100 °C are mainly addressed in order to reduce the reaction overvoltage. The research projects cover from material syntheses to actual device development. Advanced analyses with the in-situ electron microscope are also performed to design novel materials. This division is supported by Advanced Hydrogen Energy System Lab, which I am in charge of, and also collaborates with Hydrogen Utilization Process and Fuel Cell System Labs.



### Advanced System Research Division

**Junichiro YAMABE** (Research Professor)

- **Affiliation :**  
International Research Center for Hydrogen Energy
- **Academic Degree :**  
**Ph. D (Engineering)**
- **Professional Field :**  
Material strength, Fracture mechanics

#### ● Main Research Topics

- Surface coatings with excellent strength and resistance to hydrogen entry for steels
- Establishment of finite-life design method for steels in consideration of hydrogen degradation
- Hydrogen permeation of metals and surface effect on hydrogen entry and release
- Hydrogen effect on fatigue-life properties of high-strength steels

#### ● Division Introduction

The objective of this division is to precisely clarify the effect on hydrogen on mechanical and physical properties of materials used for hydrogen equipment, and then secure the safety of these materials. The development of materials with high-resistance for hydrogen environment is also conducted. These research is carried out by cooperating with Fatigue and Fracture of Materials Laboratory in Department of Mechanical Engineering and Metal Materials Research Division in HYDROEGNIUS.



### Advanced Material Research Division

**Hai-Wen LI** (Associate Professor)

- **Affiliation :**  
International Research Center for Hydrogen Energy
- **Academic Degree :**  
**Ph. D (Engineering)**
- **Professional Field :**  
Materials Engineering, Hydrogen Storage, Inorganic Materials, Functional Materials

#### ● Main Research Topics

- Syntheses and property characterizations of light element based hydrides
- Analysis of atomic arrangements and electronic structures of hydrides
- Establishment of designing guidelines of hydrides for highly efficient hydrogen storage/transportation
- Exploration and designing of hydrides with novel functions such as electrochemical

#### ● Division Introduction

In this division, our research activities aim at the development of advanced materials and systems for efficient hydrogen storage and transportation, incorporating the exploration of basic scientific principles relevant to them. In particular, we focus on the development of metal hydrides and complex hydrides for "high-density hydrogen storage", as well as "other novel functions" such as electrochemical properties. Currently we are working on projects involving the syntheses, atomic/electronic structures analyses and property characterizations of hydrides, in conjunction with Hydrogen Storage Systems Group in Department of Mechanical Engineering.