

Hydrogen Sciences Division

Realizing a Zero-CO₂ Emission Society through Innovative Materials for Efficient Hydrogen Production, Storage, and Utilization

The Hydrogen Sciences Division aims to establish a strategic research platform for realizing a zero-CO₂ emission society through innovative materials that enable efficient hydrogen production, storage, transportation, and utilization. We integrate the entire hydrogen value chain—from hydrogen production to storage, transportation, and utilization—to accelerate high-efficiency energy conversion and practical implementation. Particular emphasis is placed on developing high-performance electrode catalysts based on earth-abundant, non-precious elements to realize sustainable and cost-effective hydrogen production and fuel cell technologies. In addition, we will develop next-generation hydrogen storage materials that combine high volumetric hydrogen density with excellent safety, thereby advancing hydrogen transportation and supply infrastructure. By integrating diverse energy systems and promoting industrial and mobility applications, the division will serve as an international hub for collaborative research and become a global center leading the realization of the hydrogen society.

Overview and Mission

Hydrogen Production

- High-efficiency water electrolysis using **non-precious, earth-abundant catalysts**
- Maximization of catalytic performance through **electrode interface engineering and nanostructure control**
- Development of hydrogen production processes integrated with renewable energy



Hydrogen Storage & Transportation

- Development of **high-density hydrogen storage materials**, including boil-off suppression technologies
- Materials design emphasizing **safety, reversibility, and durability**
- System integration technologies compatible with hydrogen transportation and supply infrastructure



Hydrogen Utilization

- Fuel cell technologies based on **non-precious, earth-abundant catalysts**
- Maximization of reaction efficiency through **electrode interface engineering and nanostructure control**
- Applications to **mobility and distributed energy systems**



Organization & Members		
Hydrogen Production	Hydrogen Storage & Transportation	Hydrogen Utilization
Yoshikazu Ito	Takahiro Kondo	Kenji Suzuki
Takashi Suemasu	Susumu Okada	Keiichi Okajima
Kaoru Toko	Eiji Nishibori	Hirohisa Aki
Takeaki Sakurai	Mina Maruyama	Yutaro Akimoto
Minoru Otani	Osamu Oki	
Masaya Fujioka	Koji Sakaki (collaborator)	
Ken Sakaushi (collaborator)		

Mission
• Lead the realization of a zero-CO₂ emission society through innovative materials research integrating hydrogen production, storage, and utilization. • Develop high-performance materials based on earth-abundant, non-precious elements to achieve efficient and cost-effective hydrogen energy technologies. • Establish a world-leading international research hub to optimize the entire hydrogen supply chain.