

# The Journal of Fuel Cell Technology

## Contents

### Foreword

- **A Direction toward Rich of National Resource Country, Japan**  
Dr. Seizo Miyata—Senior Program Manager New Energy and  
Industrial Technology Development Organization ..... 1

### Special Issue Various Hydrogen Production and Hydrogen Sensor

- **The Road Map to Realize Hydrogen Energy System**  
H. Iwabuchi and Y. Ishimoto—The Institute of Applied Energy ..... 7
- **Recent Progress in Hydrogen Production Technology**  
A. Obuchi—Mitsubishi Kakoki Kaisha, Ltd. .... 14
- **Technology of Hydrogen Production by Nuclear Energy**  
M. Hori—Nuclear Hydrogen Forum ..... 20
- **Electrolytic Hydrogen Production Utilizing Patagonia's Wind Power**  
K. Murata—The Institute of Applied Energy ..... 27
- **The Technologies for Hydrogen Production by Sunlight Energy**  
T. Takata and K. Domen—The University of Tokyo ..... 34
- **Technological Overview of Hydrogen Production by Water Electrolysis**  
H. Takenaka—National Institute of Advanced Industrial Science and Technology ..... 39
- **Photobiological Hydrogen Production by Cyanobacteria**  
- aiming at large-scale H<sub>2</sub> production as primary energy -  
H. Sakurai—Waseda University  
H. Masukawa—Kanagawa University ..... 46
- **BioHydrogen —Photo Biological and Fermentative Hydrogen Production**  
T. Wakayama—KRI, Inc. & National Institute of Advanced Industrial Science and Technology  
C. Nakamura and J. Miyake—National Institute of Advanced Industrial Science and Technology ..... 53
- **Hydrogen Production by Gasification of Cellulose over Ni Catalysts**  
M. Inaba and K. Murata—National Institute of Advanced Industrial Science and Technology ..... 61
- **Development of Hydrogen Production and Storage at Western Hiroshima Prefecture Industrial Research Institute**  
K. Itoh and K. Higuchi—Western Hiroshima Prefecture Industrial Research Institute ..... 68
- **Hydrogen Production Technology Using Polyvinyl Chloride Waste and Glass Waste**  
Eika W. Qian—Tokyo University of Agriculture and Technology ..... 73
- **Small-scale Hydrogen Production from Waste Plastics Using the Catalytic Steam Reforming Process**  
K. Yoshikawa—Tokyo Institute of Technology ..... 78
- **Fuel Gas Production via Supercritical Water Gasification of Lignin**  
T. Sato, T. Furusawa and N. Itoh—Utsunomiya University ..... 84
- **Palladium-based Metal Membranes with a Small Gap at Interface**  
H. Suda—National Institute of Advanced Industrial Science and Technology ..... 91
- **The Present Situation and Some Subjects of the Hydrogen Gas Sensor**  
H. Kitaguchi—New Cosmos Electric Co. Ltd. .... 94
- **Wide-range Hydrogen Detection Using Micro-thermoelectric Sensor.**  
W. Shin—National Institute of Advanced Industrial Science and Technology ... 100
- **Characteristic Properties of New EMF-Type Hydrogen Gas Sensor**  
T. Suda and S. Harada—Niigata University ... 106
- **Development of Catalytic Combustion Type Hydrogen Sensor**  
I. Takahashi—CITIZEN WATCH CO., LTD. ... 110

●The cover is  
"Quartz Ball SAW Hydrogen Gas Sensor"  
(Tohoku Univ., Toppan, Yamatake and Ball Semicon.)

- **Hydrogen Gas Sensor Based on Surface Acoustic Wave on a Ball**  
K. Yamanaka—Tohoku University ... 119  
N. Nakaso—Toppan Printing Co. Ltd. ... 119  
T. Fukiura—Yamatake Corp. ... 119  
Dong Youn Sim—Ball Semiconductor Inc. ... 119

**Topics**

- **Improved Product Crofer 22 APU**  
F. Baba—Magnex Co., Ltd. ... 124
- **Development of Amorphous Carbon Coated Ti Bipolar Plate for PEFC**  
Y. Show—Tokai University ... 128
- **Development of SOFC—Micro Gas Turbine Combined Cycle System**  
T. Kabata—Mitsubishi Heavy Industries, Ltd. ... 132
- **Development of High Performance Carbon/Resin Molded Separator**  
M.Enomoto—Tokai Carbon Co., Ltd. ... 136
- **Development of Ionic Liquids as Electrolyte Liquids for Fuel Cells**  
H. Ohno and W. Ogihara—Tokyo University of Agriculture and Technology ... 139
- **Flexible Gas-Tight Sealing Sheets for Porous Materials**  
S. Suda—Japan Fine Ceramics Center ... 147

**Basic Lecture**

- **Materials Design for Fuel Cells by Integrated Computational Chemistry Method:6. Multi-Scale Computational Chemistry based on the Three-Dimensional Porous Structure Simulator**  
M. Koyama, T. Hattori, H. Tsuboi, N. Hatakeyama, A.Endou,  
H. Takaba, M. Kubo and A. Miyamoto—Tohoku University ... 151

**Contribution**

- **8<sup>th</sup> Japan Intercollege Solar & Fuel Cells Car Championship at Ogata Solar Sports Line**  
H. Akamatsu—Fuel Cell Commercialization Conference of Japan ... 155

**Report**

- **100<sup>th</sup> Workshop for Member—R&D of FCV at Nissan and Road Map for R&D of SOFC at NEDO**  
Y. Izaki—The Central Research Institute of Electric Power Industry ... 161
- **20<sup>th</sup> Lecture: Mobile Fuel Cells**  
A. Miyahara—FCDIC ... 163
- **7<sup>th</sup> European Solid Oxide Fuel Cell Forum**  
M. Yokoyama—Toho Gas Co., Ltd. ... 166  
K. Yashiro—Tohoku University ... 166  
T. Miyazawa—Mitsubishi Material Corp. ... 166  
N. Sakai—National Institute of Advanced Industrial Science and Technology ... 166

**Information**

S. Nagata—FCDIC ... 180

**Postscript**

H. Takano—Fuji Electric Advanced Technology Co., Ltd. ... 184