Hydrogen Viscosity Measurement with Capillary Tube Method up to 773 K and 100 MPa

Kosuke Yoshimura [C, S]
Kyushu University, Department of hydrogen energy system, Fukuoka city, Fukuoka prefecture, Japan
k.yoshimura@gibbs.mech.kyushu-u.ac.jp

Elin Yusibani
AIST, HYDROGENIUS, Fukuoka city, Fukuoka prefecture, Japan

Yosuke Nagahama and Temujin Uehara
Kyushu University, Department of hydrogen energy system, Fukuoka city, Fukuoka prefecture, Japan

Kannei Shinzato
AIST, HYDROGENIUS, Fukuoka city, Fukuoka prefecture, Japan

Masamichi Kohno and Yasuyuki Takata
Kyushu University, Department of Mechanical Engineering, Fukuoka city, Fukuoka prefecture, Japan

Hydrogen gas stations and hydrogen fuel cells have been developed and studied actively. The filling pressure of a fuel cell vehicle (FCV) is 70 MPa, and hydrogen gas is compressed up to about 100 MPa at a hydrogen gas station. Motivated by the potential of hydrogen as a major energy carrier for the near future, presently at the Research Center for Hydrogen Industrial Use and Storage (HYDROGENIUS), AIST / Kyushu University, Japan, we are attempting to re-measure the fundamental thermophysical and transport properties of hydrogen gas in the range of pressures from 0.1 to 100 MPa and 323 K to 773 K (25 to 500°). In this project, hydrogen viscosity in the range of temperatures from 323 K to 500 K at pressures up to 99 MPa has been already measured using the capillary tube method. A capillary tube is selected method for the present measurements because it is a suitable method for determining hydrogen viscosity at high temperature and high pressure measurement with a simple equation. We have changed the heating system of the apparatus for measuring in the temperature range from 323 K to 773 K at pressure up to 99 MPa. We check the performance of it with nitrogen and finally measure hydrogen viscosity from 0.1MPa to 99MPa and from room temperature to 773 K.