Keishi NISHIO  (Professor, Department of Materials Science and Technology, Faculty of Industrial Science and Technology, Tokyo University of Science)

Purpose of Research

Hydrogen energy is one of the most prospective energy sources since it has been employed in various applications, such as a fuel cell, a hydrogen vehicle, etc. However, the hydrogen gas reaches the flammability limit when about 4% to 74% of the hydrogen is contained in the atmosphere, and thus leakage prevention becomes very important. The electrical type or catalytic-combustion type hydrogen sensor has been conventionally used, but it has disadvantages that a detectable concentration range is limited and a detection speed is slow. An object of this study is to implement the hydrogen gas leakage detection with high-speed in the wide concentration range. The study focuses on a material structure, characteristics usable for detection and a device structure.

Summary of Research

A film of oxide (WO3) is prepared with a sol-gel method, and Pt/WO3, WO3 carrying platinum, is further formed on a glass substrate. The researchers have discovered that the hydrogen gas can be detected within the wide concentration range by making the optical/electrical synergy sensor using gas chromism of Pt/WO3, that is, by combing two physical properties, light and electricity. The high-speed response is realized by controlling microstructure and crystalline of the film prepared with the sol-gel method.

Expected Applications

• Hydrogen gas sensor: measuring and managing under the concerning conditions including fixed quantity from thin concentration close to the flammability limit, which especially requires the high-speed response

Challenges in Implementation

• Collaboration with measuring techniques
• System architecture

What We Expect from Companies

We are finding a partner who is willing to employ and utilize this technology in the various fields.