Hydrogen energy is attracting attention for the realization of a low-carbon society. 70 MPa-class fuel cell vehicles (FCVs) have already been commercialized in several countries. Some load-bearing components in such systems are exposed to high pressure hydrogen gas environments and some kinds of material show high susceptibility to hydrogen embrittlement in these environments. The hydrogen compatible test has been conducted in the discussion of the Global Technology Regulation No13 under collaboration with relevant countries. Therefore, we have conducted to achieve global harmonization of hydrogen compatibility testing in high pressure gaseous hydrogen.  

**Mechanism of Hydrogen embrittlement**

1. Hydrogen atoms adsorb on the material surface
2. Hydrogen atoms penetrate the interface of material
3. Hydrogen atoms diffuse in materials

**Hydrogen Compatibility Testing**

The hydrogen compatibility of metallic materials used for component of FCVs has been evaluated by following testing method.

1. Slow Strain Rate Technique (SSRT) Testing
2. Fatigue Life Testing
3. Fatigue Crack Growth Rate Testing

**Mechanism of hydrogen embrittlement in the high pressure hydrogen gaseous environment**

**Tensile properties of SUS304 in high pressure H₂**

- Yield point did not change in hydrogen.
- Ductility deterioration was observed.

Appearance of SSRT tested specimens in H₂ and air environment

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