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Study on mechanical properties of silicone rubber materials used as gaskets in PEM fuel cell environment

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ABSTRACT

The gaskets made of silicone rubber materials are compressed in the PEM fuel cell to keep the gases and the oxidant in their own zones from leaking. The paper studies the mechanical properties of the silicone rubbers exposed to high temperature, humid air, and acidic solution environment, which is similar to the real PEM fuel cell operation condition. The compression set and stress relaxation tests are performed. The results indicate that the temperature, the humid air, and the acidic solution have important effects on the mechanical properties of the silicone rubber materials. All the three factors can induce the increase of the stress relaxation modulus and the compression permanent deformation. This can accelerate the aging of the mechanical properties and decrease the sealing property of the gaskets, which will influence the durability of the PEM fuel cell.

KEYWORDS: mechanical properties, stress relaxation, compression, silicone rubber, PEM fuel cell