

## The Evaluation for Interfacial Adhesion between SOFC and Metal Adhesive in the High Temperature Environment

**Authors :** Sang Koo Jeon, Seung Hoon Nahm, Oh Heon Kwon

**Abstract :** The unit cell of solid oxide fuel cell (SOFC) must be stacked as several layers type to obtain the high power. The most of researcher have concerned about the performance of stacked SOFC rather than the structural stability of stacked SOFC and especially interested how to design for reducing the electrical loss and improving the high efficiency. Consequently, the stacked SOFC able to produce the electrical high power and related parts like as manifold, gas seal, bipolar plate were developed to optimize the stack design. However, the unit cell of SOFC was just layered on the interconnector without the adhesion and the hydrogen and oxygen were injected to the interfacial layer in the high temperature. On the operating condition, the interfacial layer can be the one of the weak point in the stacked SOFC. Therefore the evaluation of the structural safety for the failure is essentially needed. In this study, interfacial adhesion between SOFC and metal adhesive was estimated in the high temperature environment. The metal adhesive was used to strongly connect the unit cell of SOFC with interconnector and provide the electrical conductivity between them. The four point bending test was performed to measure the interfacial adhesion. The unit cell of SOFC and SiO<sub>2</sub> wafer were diced and then attached by metal adhesive. The SiO<sub>2</sub> wafer had the center notch to initiate a crack from the tip of the notch. The modified stereomicroscope combined with the CCD camera and system for measuring the length was used to observe the fracture behavior. Additionally, the interfacial adhesion was evaluated in the high temperature condition because the metal adhesive was affected by high temperature. Also the specimen was exposed in the furnace during several hours and then the interfacial adhesion was evaluated. Finally, the interfacial adhesion energy was quantitatively determined and compared in the each condition.

**Keywords :** solid oxide fuel cell (SOFC), metal adhesive, adhesion, high temperature

**Conference Title :** ICCM 2015 : International Conference on Composite Materials

**Conference Location :** London, United Kingdom

**Conference Dates :** January 19-20, 2015