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# Self-healing high-temperature functional glass for hydrogen fuel cell sealing

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## Abstract

Glass and glass-ceramics have shown potential as sealants materials for solid oxide fuel cell (SOFC) and solid oxide electrolysis oxide (SOEC). SOFCs are subjected to different thermal cycles, which required that the sealant materials have long term thermal stability and are able to repair the damages due to long term operation. It is reported these damages can be repaired by the flow of glass in the micro-cracks. However, sufficient flow of glass takes place at elevated temperature, which can deteriorate the other components of the SOFCs. Therefore, it is desired to repair the damages at lower temperature.

The self-healing in materials science is defined as the ability to recover the mechanical integrity and initial properties of a material after destructive actions of external environment or under influence of internal stresses. Self-healing has been claimed to enable an increase of the operating duration of glass seals for SOFC/SOEC. The self-repairing effect is obtained simply by heating the sealing glass above its softening temperature. This effect was shown to operate also in glass-ceramic sealants, provided that the amount of residual glass is enough to enable softening and healing.

In this lecture is presented our work both on non-autonomous and autonomous self-healing processing in glassy materials. It will be illustrating with some examples of self-healing involving glasses in the high-temperature sealing of SOFC/SOEC.

**Keywords:** Glass sealant, Self, healing, SOCs, High temperature

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