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Title: Viscous Glass Sealants for SOFC Applications

Program Manager: Dr. Joseph M. Stoffa, Project Officer
U.S. DOE NETL FPM
Power Systems Division
Phone: 304-285-0285
Fax: 304-285-4403
Email: Joseph.Stoffa@NETL.DOE.GOV

PI: Scott Misture, Inamori Professor of Materials Science
NYS College of Ceramics at Alfred University
2 Pine. St., Binns-Merrill Hall
Tel: (607) 871-2438
Fax: (607) 871-2354
Email: misture@alfred.edu

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Research Team Members: Scott Misture, Professor, Alfred University
James Shelby, Professor, Alfred University
Mark Naylor, Ph.D. student, Alfred University

Poster Abstract

Optimized glass compositions formulated under this project were characterized for application as viscous sealants in solid oxide fuel cells. Two compositional fields were investigated, galliosilicate (GaSi) and borogermanosilicate (BGS) compositions. The alkali content has been reduced to 10 mole % compared to the initial 20%, but the glasses still exhibit viscous flow below 900°C. Measured thermal expansion coefficients (200 to 500°C) range from ~8–10 ppm/K, with glass transition temperatures ranging from 540 to 670°C. The research focus has been on long heat treatments of fritted and powdered glasses at 850 °C for up to 1500 hrs in air. The GaSi glasses exhibit excellent thermal stability and low weight loss of ~0.13 wt.% after 1500 hrs at 850°C, but maintain only low amorphous content. The BGS compositions are the most promising candidates for viscous sealants, remaining ~70% amorphous after 1500 hr heat treatments at 850°C and 3 thermal cycles. Interactions of the BGS glasses with SOFC stack components of alumina, 8YSZ, and aluminized stainless steel have also been studied after annealing at 850 °C for as long as 1500hrs. Interactions with alumina can result in crystallization at the interface, but no interfacial crystallization was observed at the interface with 8YSZ. Seals between 8YSZ and aluminized steel remained intact for some of the BGS glasses after temperature cycling without applied load.