CONTAINMENT OF GROUP 1 MOLTEN CHLORIDE SALT USING AN AMORPHOUS SELF-HEALING GEOPOLYMER COMPOSITE

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Key Words: High Temperature, Molten Salt, Glass, Alumina, Self-Healing

Containment of corrosive material is a current problem that is preventing possible uses of molten salt technology. Amorphous self-healing geopolymer (ASH-G) composites are a material solution to this problem. Samples were synthesized using potassium metakaolin geopolymer, fusible glass powder, and 50-µm alumina platelets. Sintering of ASH-G occurred at 900 °C using a heating/cooling rate of 2.5 °C. Testing using cylindrical samples showed negligible mass loss of NaCl and KCl after extended duration at 805°C and 775 °C, respectively. A greater than 100-micron glaze, free of holes and cracks, was seen by SEM after initial heating. The absence of alumina in the bulk salt was verified via XRD and indicates a lack of chemical degradation.

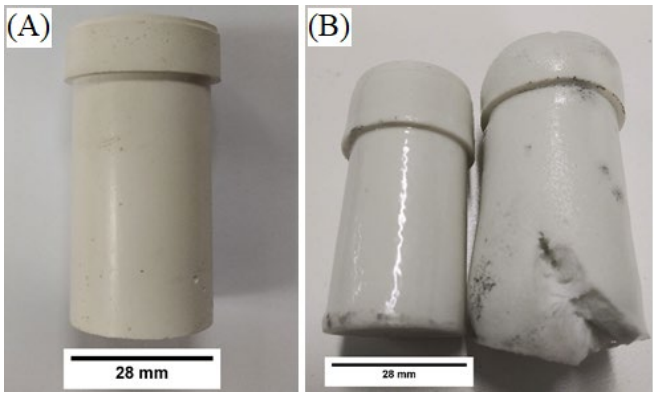

Figure 1 Alumina-Glass geopolymer composite before (A) and after (B) heating to 900 °C at 2.5 and 10 °C/min respectively.

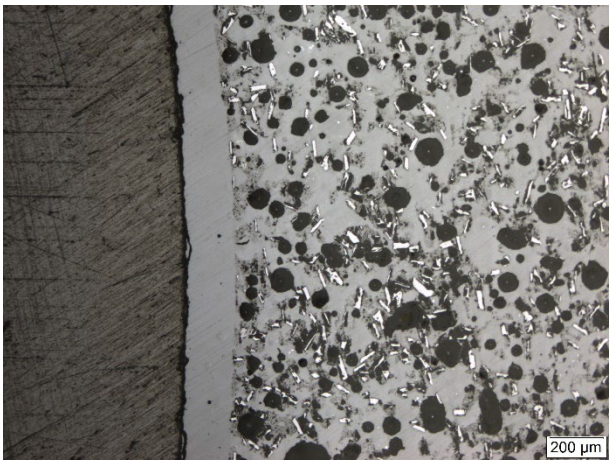

Figure 2. Polished cross section of ASH-G composite. A uniform glaze occurs on the surface after heating.