EV Gap Filler Thermal Conductivity Measurements upon Aging in Bondline Geometry

Dr. Andres Becerra, DOW Company

Thermally conductive gap fillers are a critical component in electric vehicle (EV) battery pack thermal management systems. The stability of gap fillers under relevant environmental aging conditions is a critical consideration, impacting the battery performance, lifetime and safety. The study of environmental aging effects on the thermal conductivity of gap fillers under realistic bondlines is typically restricted to ASTM D5470-type measurements on sandwich specimens which require supporting substrates (typically aluminum), glass bead spacers and contact paste. These additional materials introduce measurement variability, complicate the analysis and possibly affect the measurement itself. In this work, modular aluminum ASTM D5470 test heads have been used as the sandwiching substrates and the bondline thickness has been controlled without invasive spacers. This method eliminates the need for supplementary materials and results in application-relevant aging tests and simplified, direct material evaluation. Several thermally conductive gap fillers designed for EV battery pack thermal management were tested with this approach. Measurements of their effective thermal conductivity were conducted before and after different environmental aging conditions, including heat/humidity cycling and isothermal aging.