Material system for packaging 500°C SiC microsystems
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Abstract: In order to establish a material system for packaging 500°C SiC microsystems, aluminum nitride (AlN) and aluminum oxide (Al₂O₃) were selected as packaging substrates, and gold (Au) thick-film materials were selected as substrate metallization material for electrical interconnection system (thick-film printed wires and thick-film metallization based wire-bond) and conductive die-attach interlayer. During a 1500-hour test in atmospheric oxygen with and without electrical bias, the electrical resistance of Au thick-film based interconnection system demonstrated low and stable electrical resistance at 500°C. The electrical interconnection system was also tested in extreme dynamic thermal environment. A silicon carbide (SiC) Schottky diode was attached to ceramic substrate using Au thick-film material as the conductive bonding layer and was successfully tested at 500°C in air for more than 1000 hours. In addition to the electrical test of die-attach in static thermal environments, nonlinear finite element analysis (FEA) was used for thermal mechanical evaluation and optimization of the die-attach in a wide temperature range. © 2001 Materials Research Society. (17 refs.)

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