

Material system for packaging 500C SiC microsystems

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Source: *Materials Research Society Symposium Proceedings*, v 682, p 79-90, 2001,

Microelectronics and Microsystems Packaging

ISSN: 02729172

CODEN: MRSPDH

ISBN-10: 1558996184

Conference: 2001 MRS Spring Meeting, April 16, 2001 - April 20, 2001

Publisher: Materials Research Society

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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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