SILICON CARBIDE BONDING FOR HIGH TEMPERATURES RESISTANT JOINTS

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ABSTRACT

This work is intended to present the current status of joining development for silicon carbide-based materials used for structural applications in harsh environments. The paper reports preliminary results of our study on SiC bonding by the Spark Plasma Technique (SPS). SiC plates and disk couples were bonded by the SPS method; the samples were analyzed non-destructively by acoustic microscopy (SAM) and then by light and electron microscopy, while the mechanical properties were measured by the nanoindentation method. A comparison between the plates and disks showed a higher percentage of porosity for the disk couple, which corresponded to the existence of defects and in turn led to a lower quality bonded joint. SAM revealed bond defects for the disk couple at its periphery which will be further investigated. Mechanical characterizations are in good agreement with the values published in the literature, validating the SPS method for bonding SiC flat parts to obtain good quality joints.

KEY WORDS: Silicon Carbide, Spark Plasma Sintering, Nanoindentation, Scanning acoustic microscope, Elastic Modulus, Hardness

REFERENCES