

41st International Conference and Expo on Advanced Ceramics and Composites

Title: Failure analysis and sub-critical crack growth (SCG) characterization of Pt-Al₂O₃ high temperature co-fired (HTCC) ceramics

Abstract: Miniaturization and integration of multiple functions into one component is desired for device downsizing. HTCC alumina, with its high strength and bio-compatibility, provides an option for integration and higher reliability medical devices. A 92% alumina-platinum via HTCC material was characterized for failure modes and sub-critical crack growth, and modifications to processing were implemented to obtain a material with strength and SCG characteristics similar to bulk alumina. In phase I development, this material had strength equivalent to bulk alumina, except at low stressing rates in saline, body fluid-like environments, where a novel failure mode (circumferential cracking) was encountered. Processing changes implemented for Phase II materials led to failures emanating as radial cracks from the vias with slight loss of strength. Changes made to Phase III materials led to strength and SCG characteristics that were undistinguishable from the base materials. Fractographic evidence indicates that cracking originates tangentially to the via in Phase III material

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