

Tuning the sintered microstructure of liquid-phase sintered SiC for corrosion resistance in HF acid.

Tuesday, 1 September 2026 16:00 (20 minutes)

This study reflects a need for fine comprehension of liquid-phase sintering of SiC-Al₂O₃/Y₂O₃ ceramics for an acid corrosion application. Although the overall sintering and densification behaviour of silicon carbide is well known, this work aims to bring some new insight on the relationship between grain growth of SiC particles, the structure of the oxide intergranular phase (IGP), and the sintering conditions. To do this, low pressure Spark Plasma Sintering on a commercial SiC-Al₂O₃/Y₂O₃ powder has been used. These experiments allowed to investigate different sintering conditions in order to obtain four different dense microstructures regarding grain size and the intergranular phase: 1) Significant grain growth/crystalline IGP; 2) Low grain growth/crystalline IGP; 3) Significant grain growth/amorphous IGP; 4) Low grain growth/amorphous IGP. The impact of the addition of a fine submicronic TiC powder by freeze-drying has also been tested. The present work provides a comprehensive microstructural characterisation of the samples through SEM/EDS (general microstructure), EBSD (grain size), XRD (nature and quantity of non-SiC phases) as well as TEM observation for deeper study of the grain boundaries. The influence of grain size and crystallisation of the oxide intergranular phase on aqueous hydrofluoric acid corrosion resistance and fluorine gas bubble behaviour has been also evaluated through mass evolution and microstructural comparison.

Professional Status of the Speaker

Doctoral or Master Student

Interest in submitting a paper in a special issue of

Journal of the European Ceramic Society (Elsevier)

Invitation letter for visa

No

Author: RANNOU, Guillaume (CEA Liten)

Co-authors: Dr BERNARD-GRANGER, Guillaume (CEA); Dr BOIDOT, Mathieu (CEA Liten)

Presenter: RANNOU, Guillaume (CEA Liten)

Session Classification: Field assisted sintering technology/Spark Plasma Sintering FAST/SPS

Track Classification: Group 3: Field assisted sintering technology/Spark Plasma Sintering FAST/SPS