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Study of the sintering and oxidation behavior to the HfB₂/SiC system. Synthesis, reactivity and chemical-physical characterization.



C. Piriou¹, O. Rapaud¹, L. Charpentier², S. Foucaud¹



1 : Laboratoire Science des Procédés Céramiques et de Traitements de Surface – UMR CNRS 7315
Université de Limoges – Centre Européen de la Céramique, 12 Rue Atlantis, F-87068 Limoges Cedex - France

2 : Laboratoire Procédés, Matériaux et Energie Solaire – UPR CNRS 8521
7 Rue du Four Solaire, 66120 Font Romeu Odeillo - France

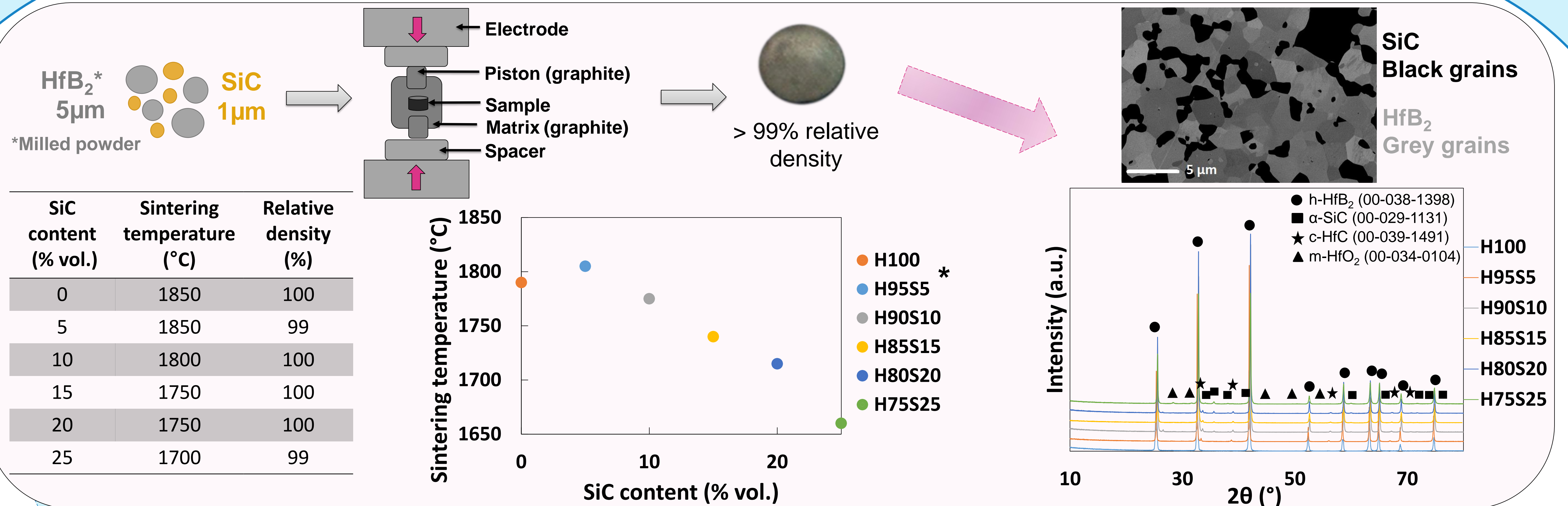


Introduction

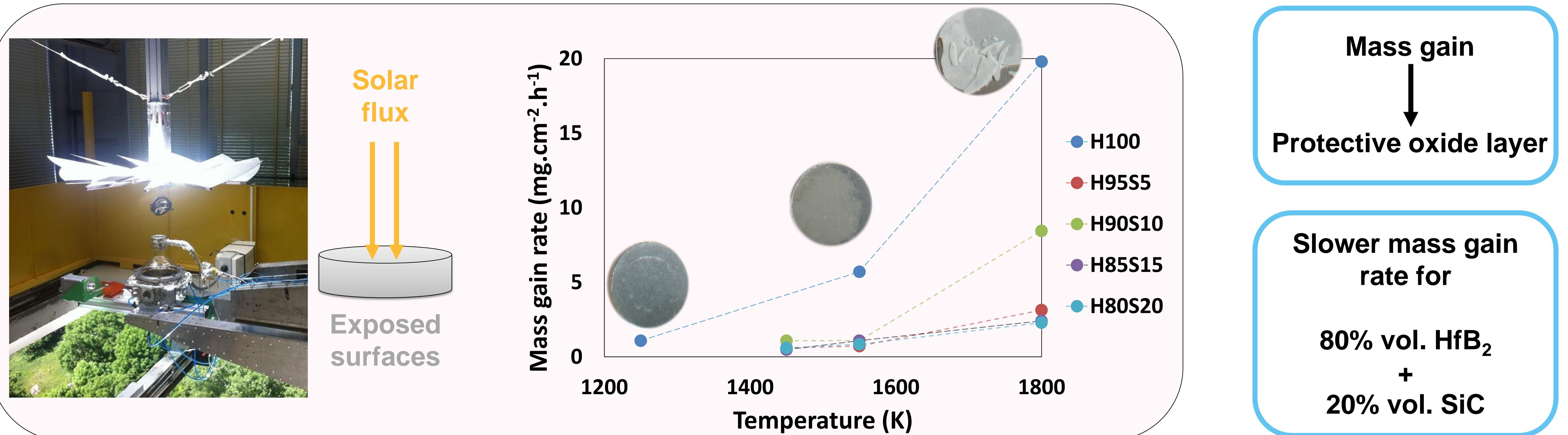
The first aim of our work consists in synthesizing Ultra High Temperature HfB₂/SiC ceramics, used as structural materials in aeronautic and aerospace areas, by Spark Plasma Sintering (SPS). This process is used to obtain fully dense materials (>99% relative density) with fine grains, at lower sintering temperature and shorter dwell time than conventional techniques. Sintered materials are then oxidized in a solar furnace and characterized in order to better understand the oxidation mechanisms.

Study of sintering and oxidation behaviour

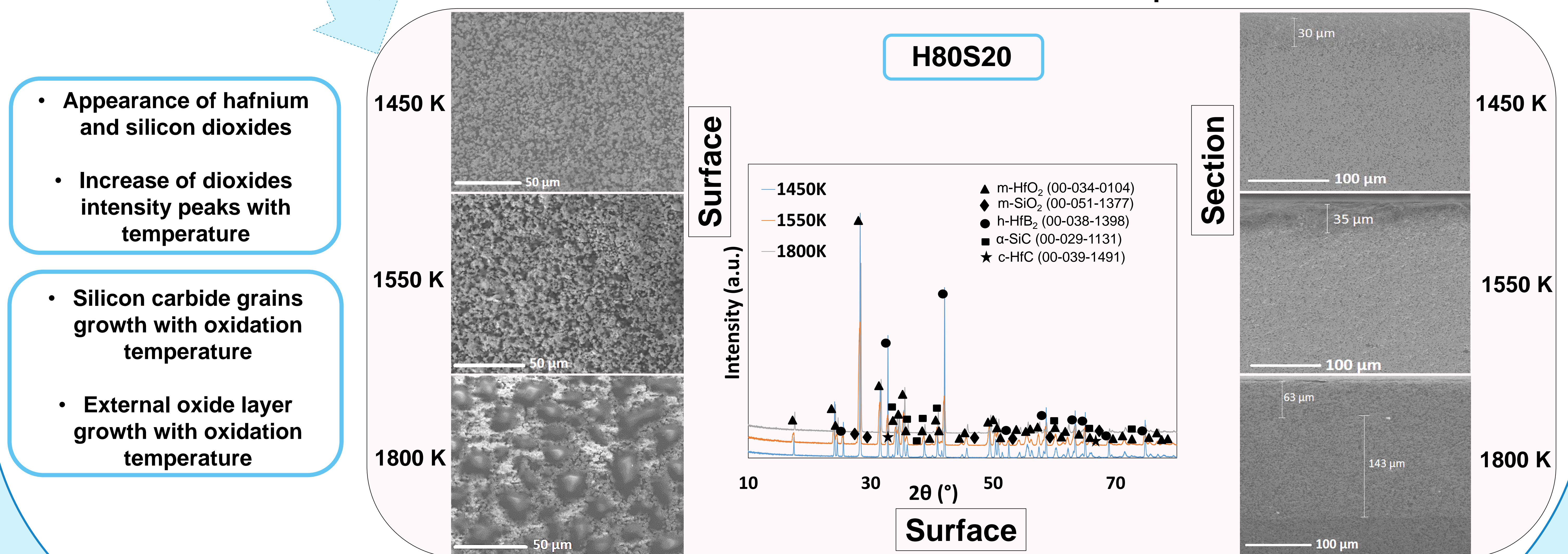
Spark Plasma Sintering (SPS)



Oxidation in solar furnace



Characterization of oxidized products



* H95S5: 95% vol. of milled HfB₂ + 5% vol. SiC

The milling was carried out in a planetary mill during 30 minutes containing 6 cycles of 6 minutes (1 minute of milling and 5 minutes rest).

Conclusion

- Sintering of fully dense HfB₂/SiC ceramics by Spark Plasma Sintering
- Decrease of sintering temperature with the addition of silicon carbide
- Oxidation tests carried out with a solar furnace up to 1800K under stagnant air

- Slower mass gain rate for the composition 80% vol. HfB₂ + 20% vol. SiC
- Different microstructures observed depending on the oxidation temperature and ceramic composition.