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Densification and High Temperature Properties of ZrB₂ and TiB₂-based Composites

Neha Gupta

Department of Materials Science and Engineering, Indian Institute of Technology

G.B. Raju

Department of Materials Science and Engineering, Indian Institute of Technology

Bikramjit Basu

Department of Materials Science and Engineering, Indian Institute of Technology

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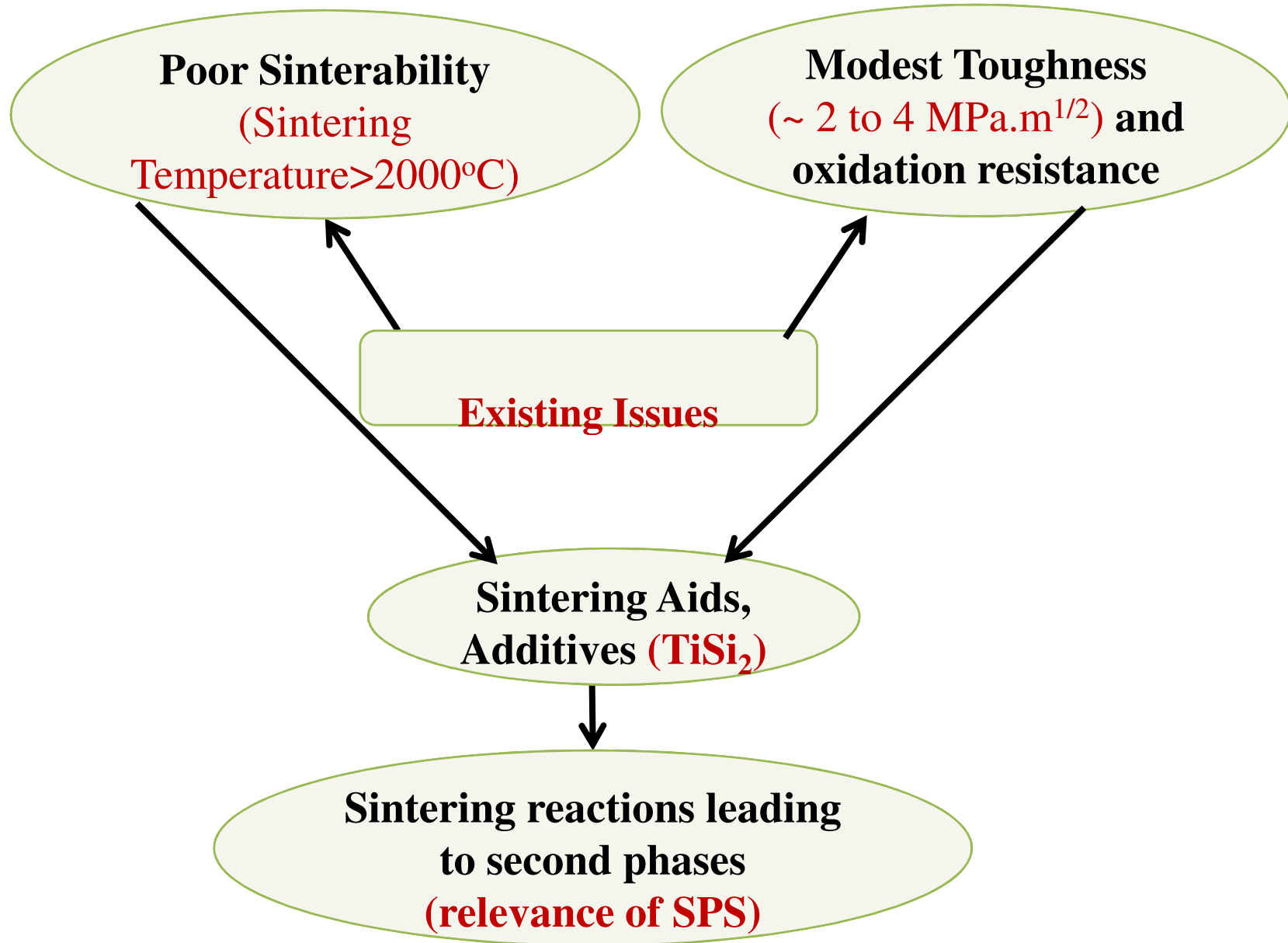
Neha Gupta, G.B. Raju, and Bikramjit Basu, "Densification and High Temperature Properties of ZrB₂ and TiB₂-based Composites" in "Ultra-High Temperature Ceramics: Materials For Extreme Environmental Applications II", W. Fahrenholtz, Missouri Univ. of Science & Technology; W. Lee, Imperial College London; E.J. Wuchina, Naval Service Warfare Center; Y. Zhou, Aerospace Research Institute Eds, ECI Symposium Series, (2013). <http://dc.engconfintl.org/uhtc/26>

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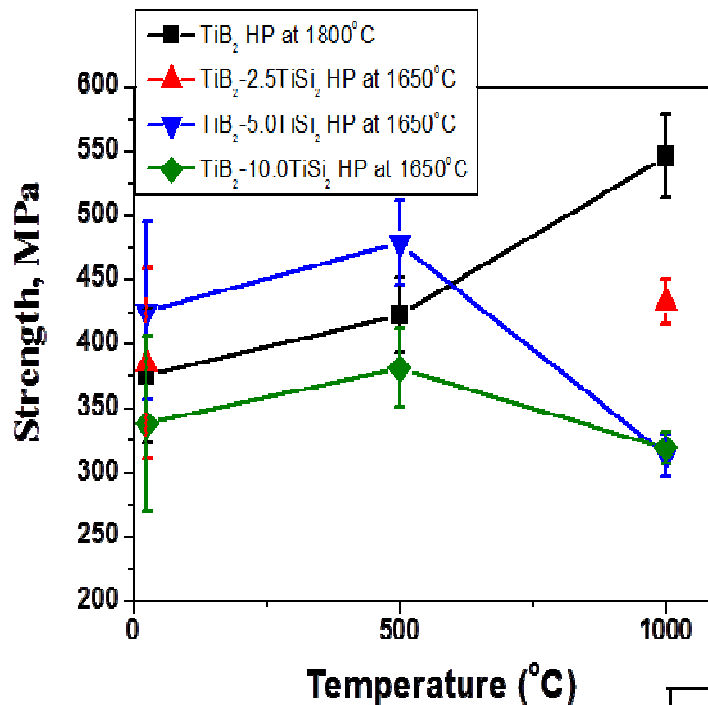
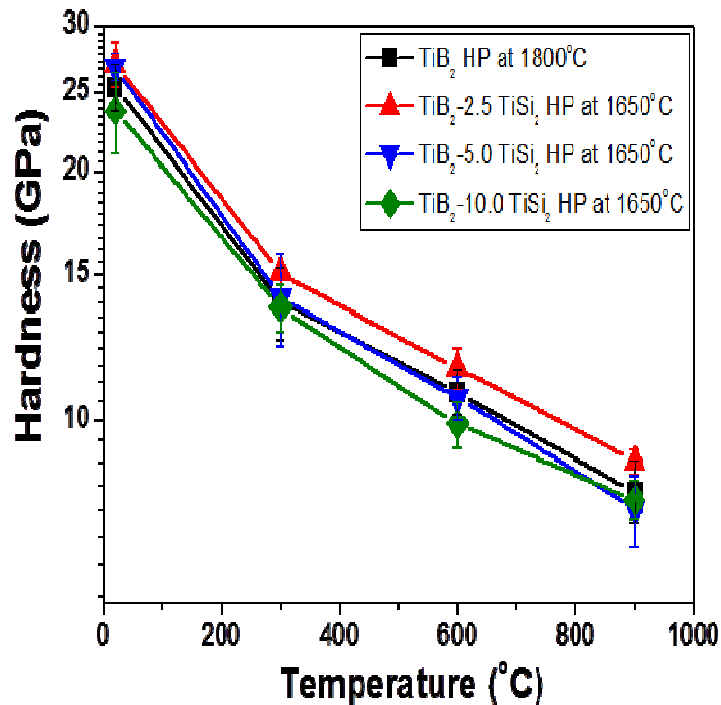
Densification and High Temperature Properties of ZrB_2 and TiB_2 -based Composites

Neha Gupta, G. B. Raju and Bikramjit Basu

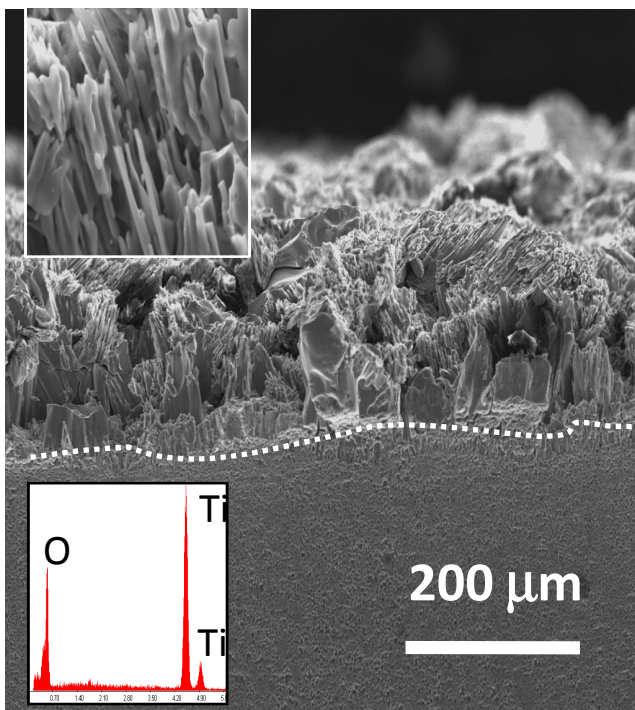
Department of Materials Science and Engineering, Indian Institute of Technology (IIT) Kanpur, INDIA.



Ceramic composition (wt. %)	Sinter conditions	Relative density (% ρ_{th})	Vickers hardness ($H_{v0.1}$), (GPa)	Indentation toughness (K_{IC}), MPa.m ^{1/2}	3-point Flexural strength (MPa)
ZrB ₂ -18SiC-0TiSi ₂	1600/10, 50 MPa	97.8	21.0±0.8	3.2±0.7	373
ZrB ₂ -18SiC-2.5TiSi ₂	“	98.2	25.6±0.4	4.1±1.2	-
ZrB ₂ -18SiC-5TiSi ₂	“	~100	26.4±0.5	5.1±0.3	497
SSS	1500/0	92.5	15.4±1.8	4.5±0.5	410.6±47
SSS	1500/10	99.2	25.1±1.9	3.5±0.3	391.0±17
TSS	1400/10, 1500/0	96.9	23.2±2.1	3.2±0.1	385.2±17
MSS	1200/5, 1400/5, 1500/0	95.8	22.1±9.7	2.5±0.6	352.8±53
MSS	1200/3, 1400/5, 1500/2	99.9	27.0±1.6	4.7±0.1	455.1±37



HP TiB₂-x wt.% TiSi₂



HP TiB₂-10 wt.% TiSi₂

composite after oxidation at 1200°C for 12 h:

- Oxide scale 250 μm thick.
- Highly textured rod-like TiO₂ (rutile) crystals.

