Zirconium diboride-based ultra-high temperature ceramics (UHTCs)

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Abstract
A ZrB_2−SiC−ZrC composite was prepared from a mixture of zirconium, silicon, and B_4C via reactive hot pressing at a relatively low temperature (1800 °C) for 60 min under 20 MPa in an argon atmosphere. The relative density was 96.8%, the micro-hardness (Hv10) was 16.7 GPa, and the fracture toughness was 5.1 $MPa \cdot m^{1/2}$. The presence of ZrC was helpful for the densification process and improved the mechanical properties of the composite. A model of the microstructure development of the composite was proposed to explain the phase distribution.

("Reactive Hot Pressing of ZrB_2–SiC–ZrC Ultra High-Temperature Ceramics at 1800°C," Wen-Wen Wuz, Guo-Jun Zhang, Yan-Mei Kan, and Pei-Ling Wang, *J. Am. Ceram. Soc*., **89**[9], 2967−2969 (2006).)

Biographical Sketch

Education

B.E. 1984: Hunan University, Conventional Ceramics, Changsha 410082, China
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Experience

7/1987-12/1996: China Building Materials Academy, Ceramics Division, Beijing 100024, China
12/1996-3/1999: Kyushu National Industrial Research Institute, Department of Inorganic Composite Materials, Tosu, Japan

4/1999-3/2001: National Industrial Research Institute of Nagoya (NIRIN) and National Institute of Advanced Industrial Science and Technology (AIST), Synergy Ceramics Lab, Nagoya, Japan
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Honors and Awards
The Science and Technology Award for Youth, 3/1996
The Chinese Ceramic Society awards 10 young researchers who have gained excellent achievements in ceramics, cement and glass areas "The Science and Technology Award for Youth" every two years.

Research interests
in-situ composites and microstructure control; in-situ reaction process of ceramic; ceramic composites; cermets; intermetallics-ceramics-metal composites; special refractories; laminate composites and mimicking of nature's materials; corrosion of advanced ceramics; porous ceramics; ultra high temperature ceramics