Contribution ID: **50** Type: **2. Invited speaker (by invitation only)**

Effect of additive and annealing on the ultra-high temperature strength of ZrB2

A simple method to obtain highly refractory boride-based ceramic nanocomposites is here discussed.
Fundamental requirement to preserve flexural strength above 500 MPa in the ultra-high temperature regime is to promote the development of a hierarchical structure. This includes core-shell grains, where the shell is a (Zr,Me)B2 solid solution grown around the native MB2 grain, already during sintering.
In the present case, introduction of W-, Mo- or Ta-based compounds enabled us to form micro-sized shells around the original MB2 cores. Subsequent annealing at high temperature further developed a nano-texturing in the shell, where metallic W, Mo or TaC nanoparticles precipitated within the shell and allowed to achieve unprecedented refractoriness up to 2100℃.
Here we show the microstructural features of different diboride composites and show how these microstructural change impact on local properties measured by nanoindentation and on the ultra-high temperature strength.
The unique microstructural findings here reported open vast opportunities for nano-composite ceramic development, manufacturing and applications.

Professional Status of the Speaker

Senior Scientist

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

No

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