Mechanical properties of zirconium dioxide and silicon nitride composites

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Abstract

In this study, the mechanical properties of ZrO_2-Si_3N_4 composites containing 3.12 mass% MgO as a stabilizer sintered at 1600˚C for 4 hr in a nitrogen atmosphere has been investigated. XRD phase analysis showed addition of Si_3N_4 destabilized tetragonal zirconia phase and caused the formation of monoclinic zirconia phase, also zirconium oxide nitride phase was formed in the sample with 10 and 15 mass% Si_3N_4[1]. SEM microstructure revealed that the grain size of the specimens decreased with increasing content of Si_3N_4. EDS analysis displays magnesium content increased in the grain boundaries with adding Si_3N_4. The results indicated that ZrO_2 containing 10 and 15 mass% Si_3N_4 were performed higher hardness values than stabilized zirconia[2]. The room temperature mechanical properties of flexural strength decreased with 5 mass% Si_3N_4 then increased with increasing Si_3N_4 content.

References

[1] S. Berendts, M. Lerch, Journal of Crystal Growth, **336** (2011) 106–111.
[2] S. Chockalingam, V. R.W. Amarakoon, Journal of the Ceramic Society of Japan**, 116 [6]** (2008) 700-705.

Figures

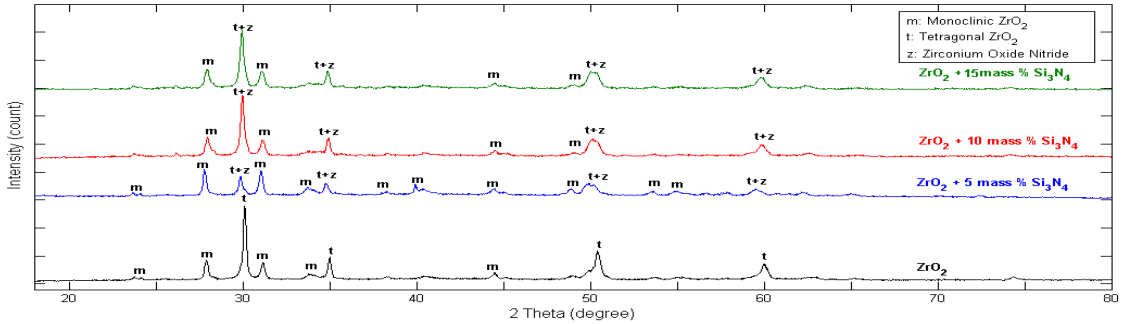

Fig1. XRD phase analysis of ZrO_2-Si_3N_4 composites.

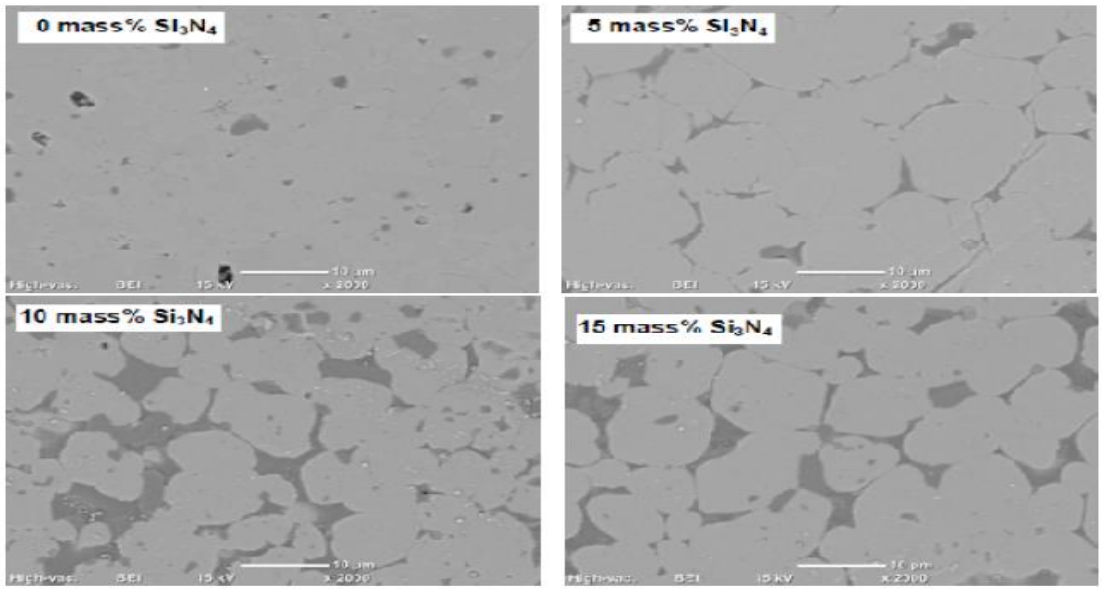

Fig2. SEM microstructure of ZrO_2-Si_3N_4 composites.