

## Characterization of Whisker Alignment in $\text{Si}_3\text{N}_4$ (w)/ $\text{Si}_3\text{N}_4$ Composites

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Three kinds of  $\text{Si}_3\text{N}_4$  (w)/ $\text{Si}_3\text{N}_4$  composites with different whisker alignment were designed and fabricated. First, tapes and wires of  $\text{Si}_3\text{N}_4$  containing  $\beta$ - $\text{Si}_3\text{N}_4$  whiskers were prepared by tape casting and extrusion processing respectively, which had different whisker alignment. Then three types of green bodies were obtained by stacking the tapes, the wires, and alternate of the tapes and wires. The same whisker orientation was followed in all the processes of stacking. The composites were finally obtained by hot pressing after binder burn out had been conducted for the green bodies. The whisker alignment of the composites was characterized quantitatively by normalized pole density based on X-Ray Diffraction (XRD) measurement. The normalized pole density  $W_{hkl}^1$  near the normal line of the surface perpendicular to the whisker alignment direction was used to characterize the degree of the whisker alignment. The distribution of normalized pole density of the (002) lattice plane was obtained. The whisker alignment was further approved by Scanning Electron Microscopy analysis (SEM).

## SPSed-RBSN 소결체의 미세조직 및 기계적 특성

### Microstructures and Mechanical Properties of SPSed-RBSN Bodies

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$\text{Si}_3\text{N}_4$ 는 고온특성이 우수하여 다양한 기계소재 부품으로 응용이 진행되고 있다. 액상소결을 통한 고밀도의  $\text{Si}_3\text{N}_4$ 를 얻기 위해서 그 동안 HP, GPS, HIP 등의 비교적 소결시간이 긴 소결법에 의해 고인성을 목표로 bimodal 미세조직 제어와 복합화에 관한 연구가 주류를 이루고 있었다. 본 연구에서는 fine unimodal 미세조직을 얻기 위해 소결시간이 단축된 SPS 소결기술을 이용하여 초기 Si 입자가 RBSN 및 SPS 소결체의 미세조직과 기계적특성에 미치는 영향을 고찰하고자 한다.

1430°C의  $\text{N}_2$  분위기 하에서 2  $\mu\text{m}$ 와 7  $\mu\text{m}$  Si 분말을 이용하여 RBSN을 제조하였다. 이들 RBSN 소결체는 SPS 공정에 의해 후소결을 행하였다. SPS 소결체의 경도, 파괴인성, 곡강도를 측정하였으며 XRD, SEM, TEM을 이용하여 결정구조 및 미세구조를 관찰하였다.