

Abstract Submitted
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Phase transition behavior of silicon nitride under shock loading and unloading process NOBUAKI KAWAI, Kumamoto University — Shock wave profile measurements were performed on silicon nitride ceramics to investigate its shock-induced phase transition behavior. Experimental results clearly show the formation of the shock wave with multi-wave structure associated with the occurrence of elastic-plastic transition and phase transition under shock-loading process. The stress wave following the phase transition wave consists of ramp wave followed by steep shock wave. The formation of the ramp wave indicates the existence of non-crystalline intermediate phase between crystalline low pressure phase and crystalline high pressure phase. On the stress release from the shocked state which is compressed over phase transition point, release wave structure shows steep slope in the middle of release process indicating the occurrence of reverse transition. The stress ranges of the ramp compression in loading process and the steep release in unloading process are quite similar each other. The stress width of that region is about 10 GPa. This result indicates that the crystal structure of shocked silicon nitride become unstable in this stress region. The existence of this unstable phase region is considered to be caused by the sluggish nature of the phase transition mechanism of silicon nitride.

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