Hugoniot measurement and high-pressure phase transition of beta-SiAlON

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— We have measured Hugoniot of beta-Si$_4$Al$_2$O$_2$N$_6$ ceramics up to about 120 GPa. The HEL and the onset pressure of phase transformation is smaller than those of beta-Si$_3$N$_4$. According to shock recovery results of beta-SiAlON, the recovered high-pressure phases are a cubic spinel and amorphous phase. The amount of amorphous phase increases with increasing pressure. Analysis of the high-pressure region of Hugoniot suggests a series of phase transitions with increasing pressure. A comparison of Hugoniot measurement and recovery results of beta-SiAlON indicates the post-spinel phase will not be quenchable. The partially released states have been determined by the buffer method and the results indicate a large hysteresis.

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