

Abstract Submitted
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Shock-induced optical emission from yttria-doped cubic zircon single crystal: crystal orientation effects XIUXIA CAO, XIANMING ZHOU, CHUANMIN MENG, CAEP — The shock-induced optical emission from yttria (Y_2O_3)-doped cubic zircon single crystal ($\langle 100 \rangle$ and $\langle 110 \rangle$ crystal orientations) under the pressure range from 30 to 52 GPa was measured by the time-resolved 40-channel optical pyrometer at discrete wavelengths ranging from 400 to 800 nm. Clear periodic fluctuation was observed in spectral radiance history of $\langle 110 \rangle \text{ZrO}_2$, while a noise fluctuation was found in $\langle 100 \rangle \text{ZrO}_2$. The gray-body function was used to fit the spectral radiance histories. We found that the obtained apparent temperature varied slightly with time, but the emissivity history showed a fluctuate increase with time. Moreover, all the temperature data were independent of shock stress and were well above the calculated Lindeman melting temperature. Present result suggests that the optical emission relates to the shock-induced local hot spots, and its crystal orientation effect is attributed to the different dynamic deformation response between $\langle 100 \rangle$ and $\langle 110 \rangle \text{ZrO}_2$.

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