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High Pressure Studies on (111)-Terminated CeO_2 Nano-Octahedrons: The Major Effect of Non-Hydrostatic Conditions LIU BO, LI QUANJUN, LIU RAN, YAO MINGGUANG, LIU BINGBING, State Key Laboratory of Superhard Materials, Jilin University — The effect of nonhydrostatic conditions on high pressure phase transition on (111)-terminated CeO_2 nano-octahedrons were studied using in situ high-pressure Raman spectroscopy. Under non-hydrostatic conditions (with no pressure medium) the CeO_2 nano-octahedrons underwent a reversible phase transition from fluorite phase to α-$PbCl_2$ phase at 26 GPa, which is lower than the bulk counterpart. In contrast, in our previous research, the CeO_2 nano-octahedrons under hydrostatic conditions are shown to be more stable than the bulk, which is driven by lower compressibility of the exposed (111) planes. The transition pressure from cubic to orthorhombic phase is approximately 3 GPa higher than bulk materials. Further analysis shows that lager stress existing in the grain boundaries is believed to major factor to reduce the phase transition under non-hydrostatic conditions.

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