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Hyperstoichiometric Oxygen in Fluorite-type U_3O_8 Formed at Extreme Conditions FUXIANG ZHANG, MAIK LANG, ROD EWING, University of Michigan, DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES TEAM — U_3O_8 was obtained by annealing UO_3 in a reducing atmosphere at 200 °C. Powder sample of β-U_3O_8 was pressurized at room temperature up to 37.5 GPa and XRD patterns clearly indicated that a phase transition occurred between 3-11 GPa. The high-pressure phase is a fluorite-like structure. The high-pressure phase was then laser heated to over 1700 K in the diamond anvil cell at high pressure conditions. No phase transition was found at high pressure/ temperature conditions, and the fluorite-like structure of U_3O_8 is even fully quenchable. The lattice parameter of the fluorite-like high-pressure phase is 5.425 Å at ambient conditions, which is smaller than that of the stoichiometric UO_2. Previous experiments have shown that the stoichiometric uranium dioxide (UO_2) is not stable at high pressure conditions and starts to transform to a cotunnite structure at $\sim$ 30 GPa. When heating the sample at high pressure, the critical transition pressure is greatly reduced. However, the fluorite-like high-pressure phase of U_3O_8 is very stable at high pressure/high temperature conditions. The enhanced phase stability is believed to be related to the presence of extra oxygen (or U vacancies) in the structure.

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