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# In situ structure determination of the high-pressure phase of $Fe_3O_4$

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## ABSTRACT

The crystal structure of a high-pressure $Fe_3O_4$ phase was determined by in situ X-ray diffraction measurements at high pressure and temperature, using an imaging plate detector and monochromatic synchrotron X-radiation. The high-pressure phase has the *Pbcm* space group ($CaMn_2O_4$-type structure) with cell parameters $a$ = 2.7992(3) Å, $b$ = 9.4097(15) Å, and $c$ = 9.4832(9) Å at 23.96 GPa and 823 K. $Fe^{3+}$ occupies an octahedral site and $Fe^{2+}$ is in an eightfold-coordinated site described as a bicapped trigonal prism. The high-pressure $CaMn_2O_4$-type $Fe_3O_4$ phase is about 6.5% more dense than the spinel form at 24 GPa.