

MS15-02 | HIGH-PRESSURE SYNTHESIS AND PROPERTIES OF IRON OXIDES

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Iron oxides are common and fundamentally important materials for natural sciences. In this presentation, we will review a progress on high-pressure high-temperature (HP-HT) synthesis of novel iron oxides, like Fe_4O_5 , Fe_5O_6 , Fe_7O_9 , Fe_5O_7 , Fe_9O_{11} , FeO_2 , and others, and present recent results on high-pressure low-temperature behaviour of one of them, namely, Fe_4O_5 . We will present the results of combined single-crystal X-ray diffraction, Mossbauer spectroscopy and magnetization measurements, performed on Fe_4O_5 samples under high pressure at low temperature. We will show how the applied pressure that tunes the distances between the neighbouring iron atoms can switch the charge-ordering type between the trimers and dimers. We will show that the charge-ordering processes in iron oxides are predetermined not only by spin and charge interactions, but also by “chemical” interactions between the neighbouring iron atoms. We synthesized large single crystals of Fe_4O_5 using multi-anvil high-pressure high-temperature synthesis facilities, and the major part of the studies has been done on single crystals. We will report and discuss the first P-T phase diagram of Fe_4O_5 . We also discuss some preliminary results for the other iron oxides.