# Magnetic ordering in (Mg,Fe)O and its compositional dependence.

# Atsuhiro Fujii[1]; Toshifumi Taniguchi[2]; Tadashi Kondo[3]; Tatsuhiro Sakaiya[4]

[1] Physics,Osaka Univ; [2] Graduate School of Sci., Osaka Univ.; [3] Osaka Univ.; [4] none

Magnesiowustite, (Mg,Fe)O, is believed to be one of the major constituents of the Earth's lower mantle. It is important for understanding the deep earth's interior to study the physical properties of (Mg,Fe)O. While no phase transition has been found in MgO so far in both static and shock wave measurements, the high pressure behavior of FeO is quite different from that of MgO. At about 16GPa, FeO distorts from the B1 structure into a rhombohedral cell probably due to an anti- ferromagnetic ordering from the paramagnetic state. The B1-rhomobohedral phase boundary has been suggested to be coupled with the magnetic ordering. Therefore, the phase boundary in (Mg,Fe)O may sift toward lower temperature with decreasing of iron content. The relationship among the magnetic change, composition, and structure is a still debated issue. In this study, we have investigated the compositional dependence of the Neel temperature at room pressure.

The (Mg,Fe)O with variable Fe contents were synthesized from MgO and Fe{2}O{3} at 1200 degrees C for 12 hours under the controlled oxygen fugacity. The samples were sinterd repeatedly in the gas furnace unless the powdered sample was confirmed to be a single phase with a B1 structure by X-ray diffraction method. The magnetic susceptibility was measured at every 5K in the temperature range between 5 and 300 K, using a SQUID at constant magnetic field of 1000G. We determined estimate the Neel temperature from the measured M-T relation. We estimated also the number of effective Bohr magneton in each sample assuming the Curie-Weiss law. The obsereved Neel temperatures of the samples, Fe95mol%, Fe50mol% and Fe20mol%, were 190(30)K, 55(5)K, 17(3)K, respectively. They were lower than that of pure FeO of 198K. The estimated Bohr magneton indicated a significantly higher spin moment than typical values of $Fe^{2+}$ and Fe{3+}, suggesting a small heterogeneous of the anti-ferromagnetic arrangement in the sample.