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Neutron Diffraction Study of Magnetic Ordering in $\text{Ce}(\text{Mn}_{1-x}\text{Fe}_x)_2\text{Ge}_2$. Vadim Sikolenko^a, Ekaterina Pomjakushina^b, Antonio Cervellino^b, Anatoly Senyshyn^c. ^aETH Zurich and Paul Scherrer Institute. ^bPaul Scherrer Institute. ^cTechnical Universitt Munich.

E-mail: vadim.sikolenko@psi.ch

Crystal and magnetic structure of $\text{Ce}(\text{Mn}_{1-x}\text{Fe}_x)_2\text{Ge}_2$ with $x = 0, 0.6, 0.8$ have been studied by neutron powder diffraction. All these ternary compounds crystallize in the body-centered tetragonal ThCr_2Si_2 -type structure (I4/mmm). But magnetic properties are different. They can be considered as an interaction of two magnetic sublattices: Ce-subsystem and Mn-subsystem, but in case of CeMn_2Ge_2 ions of Ce are nonmagnetic. On the other side, intralayer Mn-Mn exchange interaction is the strongest and this fact leads to ferromagnetic coupling of the Mn moments along c-axis. But the interlayer Mn-Mn exchange is very sensitive to the lattice parameters which leads to ferromagnetic or antiferromagnetic ordering of the Mn sublattice. When Mn is replaced by another 3d element Fe the Curie or Neel temperatures decrease and a new magnetic phases appear with increasing amount of transition metal. We have observed the magnetic contribution for nuclear reflexes (hkl) with $h+k = 2n$, which could be corresponds to ferromagnetic components on the Mn sublattice. Pure CeMn_2Ge_2 indicates appearance of the satellites (101)⁺ and (101)⁻. With the substitution Mn by Fe these satellites disappear. This fact means that magnetic structure is canted for the pure compound and ferromagnetic for the substituted samples. Crystal structure is similar for all samples (I4/mmm tetragonal lattice) but with the increasing of Fe substitution level unit cell volume decreases as well as Mn-Mn distances and magnetic contribution to the nuclear peaks.

Keywords: neutron powder diffraction; magnetism; intermetallic structures

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Magnetic Structure of ZnFe_2O_4 . Aleksandar Kremenovic^{a,b}, Predrag Vulic^b, Bratislav Antic^a, Emil S. Božin^c, Jovan Blanus^a. ^aINS "Vinca", Serbia. ^bFMG, University of Belgrade, Serbia. ^cColumbia University, New York, USA.

E-mail: akremen@EUnet.rs

ZnFe_2O_4 spinel with pyrochlore sublattice of corner-sharing Fe-tetrahedra belongs to a group of frustrated magnetic materials [1]. For a normal ZnFe_2O_4 spinel, colinear and non colinear magnetic spin arrangements are indicated, which could be equally compatible with neutron diffraction powder intensities observed at 5 K. It is well established that the material orders at 10 K temperature into a ground state which can be described by an ordering vector $\mathbf{k} = (0\ 0\ 1/2)$, into a magnetic structure involving 32 spins [2]. Results of refinement of the non colinear magnetic structure

model, described by König et al. [2], on the basis of TOF neutron data collected at 5K at SEPD instrument at IPNS at Argonne national Laboratory will be presented.

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[1] Greedan, J.E., *J. Mater. Chem.*, **2001**, 11, 37. [2] König, U., Bertaut, E.F., Gros, Y., Mitrikov, M., Chol, G. *Sol. Stat. Commun.*, **1970**, 8, 759.

Keywords: magnetic structure; time-of-flight diffraction; ferrite

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Mesoporous 3-d Transition Metal Oxides: Magnetic and Crystallographic Studies. Adrian H. Hill^{a,b}. ^aSchool of Chemistry, The University of Edinburgh, UK. ^bEuropean Synchrotron Radiation Facility, France.

E-mail: adrian.hill@esrf.fr

The magnetic properties of the first row transition metal oxides are wide and varied and have been studied extensively since the 1930's. Observations that the magnetic properties of these material types change with the dimension of the sample have stimulated many theoretical and experimental studies of the systems involved. As sample sizes decrease towards the nanoscale long range crystallographic order is no longer possible. However, the application of mesoporous silica samples as hard exo-templates to direct the formation of mesoporous metal oxides has provided a new opportunity to explore the influence of scale of crystallographic order further. These types of samples have pore systems running through the material on the mesoscale (diameter between 2-50 nm) with pore walls truly in the nanoscale region (7-9 nm thick) whilst crystallographically ordered over large scale distances (see figure showing mesoporous Cr_2O_3). The work presented here shows magnetic and crystallographic studies of a variety of the first row transition metal oxides in three dimensional mesoporous forms predominantly using SQUID magnetometry and neutron powder diffraction. Particular attention is focussed upon a sample of mesoporous hematite, $\alpha\text{-Fe}_2\text{O}_3$ which shows suppression of a well defined first-order magnetic phase transition (the Morin transition).[1] This suppression has been studied extensively with neutron powder diffraction and preliminary inelastic neutron spectroscopic measurements. Comparisons with hematite nanoparticles which also show the suppression of the Morin transition can be drawn.[2]

