



TRR 80 Seminar

Am Dienstag, den 7. Mai um 16:00 Uhr

spricht

Dr. Angel M. Arévalo-López

University of Lille

über das Thema

High pressure A-site manganites: Structures and properties

The discovery of new materials with appealing functional properties is challenging and such properties are often observed in complex oxides containing transition metals in intermediate or unusual oxidation states which must be stabilised under special synthetic conditions.

A²⁺ cations in perovskites synthesized at ambient pressures are typically large, nonmagnetic atoms, such as A = Ca, Sr, Ba, Pb. However, materials with the smaller high-spin Mn²⁺ ion at A sites have been synthesized under high-pressure and high-temperature conditions. This may introduce additional functionality as found in MnVO₃ perovskite which is metallic but also has coexisting helimagnetic order of localized S = 5/2 Mn²⁺ spins [1].

Several Mn₂BB'O₆ double perovskites have also been synthesized at high pressures.

Mn₂FeReO₆ has a high Curie temperature of 520 K and similar ferrimagnetic and spin polarized conducting properties to the much-studied magnetoresistive material Sr₂FeMoO₆, but also shows a novel switch from negative to large positive magnetoresistances at low temperatures driven by Mn²⁺ spin ordering [2]. In contrast, Mn₂MnReO₆ (Mn₃ReO₆) shows successive antiferromagnetic ordering transitions for Re and Mn spins at 99 and 109 K, respectively. Our subsequent investigation of possible rare earth (R) double perovskites Mn₂RSbO₆, has led to the discovery of a new double double perovskite type for MnRMnSbO₆ with large R cations, as well as more conventional (MnR)MnSbO₆ double perovskites formed for smaller rare earth metal ions.

The new type of double double perovskite structure in the MnRMnSbO₆ (R= La, Pr, Nd, and Sm) family has a columnar order of A-site Mn²⁺ and R³⁺ cations whereas Mn²⁺ and Sb⁵⁺ have rock salt order on the B sites. Mn²⁺ cations are in tetrahedral and square-planar A-site environments and octahedral B sites, see Figure 1 [3].

I'll be presenting our endeavour on new Mn²⁺ oxides obtained under high pressure along with structural and physical properties studies.

[1] M. Markkula *et al.* (2011) *Phys. Rev. B*, 84, 094450.

[2] A. M. Arévalo-López *et al.* (2015) *Angew. Chem. Int. Ed.*, 54, 12074-12077.

[3] E. Solana-Madruga *et al.* (2016) *Angew. Chem. Int. Ed.*, 55, 9340-9344.

Gäste sind herzlich willkommen.

Der Vortrag findet im Seminarraum S-288, Institut für Physik,
Universität Augsburg statt.

Gastgeber: Dr. Alexander A. Tsirlin

www.trr80.de