

平成 27 年 9 月 11 日
応用物理学会北海道支部
会員各位

応用物理学会北海道支部講演会のお知らせ

下記講演会を開催いたしますので、多数ご参加下さいますようご案内申し上げます。

演題：Role of pressure on Critical Behavior of some Perovskite Manganites

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日時：平成 27 年 10 月 13 日（火） 16:00～17:00

場所：室蘭工業大学 教育・研究 1 号館 A 棟 A322（電気電子系セミナー室）

共催：応用物理学会北海道支部（主催団体：日本物理学会北海道支部）

講演の要旨

The high-pressure technique has been recognized as one of the powerful tools to investigate the physical properties of solids because pressure can vary physical parameters cleanly, not introducing disorder. High pressure, which effectively increases the electron transfer interaction or the one electron band-width, is a powerful tool for investigation of the electronic and magnetic properties of manganites. In this lecture, few results on critical behavior of cubic perovskites under pressure and magnetic field will be discussed. Hydrostatic pressure dependence of the order of phase transition in $(\text{Sm}_{0.7}\text{Nd}_{0.3})_{0.52}\text{Sr}_{0.48}\text{MnO}_3$, $\text{La}_{0.4}\text{Bi}_{0.3}\text{Sr}_{0.3}\text{MnO}_3$ and $\text{Pr}_{0.6}\text{Ca}_{0.4}\text{Mn}_{0.96}\text{B}_{0.04}\text{O}_3$ (B = Co and Cr) systems were analyzed. At ambient pressure, these systems undergo a first-order paramagnetic insulator to ferromagnetic-metallic phase transition. The application of pressure on magnetization of $(\text{Sm}_{0.7}\text{Nd}_{0.3})_{0.52}\text{Sr}_{0.48}\text{MnO}_3$ and $\text{La}_{0.4}\text{Bi}_{0.3}\text{Sr}_{0.3}\text{MnO}_3$ systems suppress the first-order paramagnetic to ferromagnetic, and leads the second-order one under 1.21 and 0.91 GPa. Similarly, first-second order crossover takes place, are 2.02 and 2.40 GPa for Co and Cr doped samples respectively. In order to understand the nature of ferromagnetism in second order transition, it is essential to determine the critical values,

and the assigning them for existing theoretical models such as mean-field, tricritical, Heisenberg and 3D Heisenberg etc., Here, the estimated values for $(\text{Sm}_{0.7}\text{Nd}_{0.3})_{0.52}\text{Sr}_{0.48}\text{MnO}_3$ and $\text{Pr}_{0.6}\text{Ca}_{0.4}\text{Mn}_{0.96}\text{Co}_{0.04}\text{O}_3$ are close to the 3D Heisenberg model for the Co doped sample suggesting short-range FM interaction. On the other hand, the estimated values for $\text{La}_{0.4}\text{Bi}_{0.3}\text{Sr}_{0.3}\text{MnO}_3$ and $\text{Pr}_{0.6}\text{Ca}_{0.4}\text{Mn}_{0.96}\text{Cr}_{0.04}\text{O}_3$ are close to the 3D Heisenberg model for the Co doped sample suggesting long-range interaction.

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