Magnetic ground state in highly hydrogen doped $LaFeAsO_{1-x}H_x$

M. Hiraishi[1*], K. M. Kojima[1, 2], I. Yamauchi[1], M. Miyazaki[1], A. Koda[1, 2], R. Kadono[1, 2], S. Iimura[3], S. Matsuishi[4], and H. Hosono[3, 4]

[1] *Institute of Materials Structure Science, KEK, Tsukuba, Ibaraki 305-0801, Japan*

[2] *Department of Materials Structure Science, The Graduate University for Advanced Studies,Tsukuba, Ibaraki 305-0801, Japan*

[3] *Materials and Structures Laboratory, Tokyo Institute of Technology, Yokohama, Kanagawa 226-8503, Japan*

[4] *Materials Research Center for Element Strategy, Tokyo Institute of Technology, Yokohama, Kanagawa 226-8503, Japan*

 # a corresponding author: E-mail hiramasa@post.kek.jp

The existence of secondary superconducting dome (SC2) in Fe-based superconductors $LaFeAsO_{1-x}H_x$ was revealed by the recent development of hydrogeneration technique [1]. Moreover, the maximum T_c of ~36 K in SC2 around $0.2 \leq x \leq 0.4$ is higher than that of ~26 K in the first superconducting dome (SC1) around $0.05 \leq x \leq 0.2$, drawing broad attention regarding the difference in superconducting mechanism between SC1 and SC2. The relationship of SC2 with magnetism would be of particular interest in comparison to that of SC1. In search of magnetism in high-doping region, we conducted μSR experiment in polycrystalline samples of $LaFeAsO_{1-x}H_x$ with $x \simeq 0.4$ - 0.5 at J-PARC and PSI [2].

It is inferred from μSR under zero-external field that these samples exhibit mesoscopic phase separation into magnetic and non-magnetic domains, where the volumetric fraction of the magnetic domain as well as transition temperature T_N (shown in Fig. 1) depends on x. Strongly damped oscillation signal observed in the magnetic domain suggests that the magnetic state is highly inhomogeneous.

In this presentation, we also present results of Hartree potential and dipole field calculations, and discuss the distinct features of the magnetism in comparison with that in LaFeAsO ($x = 0$) [3].

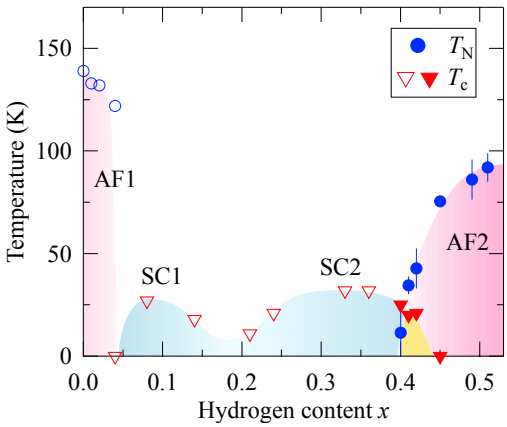

Fig. 1: Electric phase diagram of magnetic transition temperature T_N determined by μSR (filled blue circles) on $LaFeAsO_{1-x}H_x$.

References

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