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A complete phase diagram of high Tc iron oxypnictide SmFeAsO_{1-x}H_x SOSHI IIMURA, HIROSHI OKANISHI, SATORU MATSUSHI, Tokyo Institute of Technology, HARUHIRO HIRAKA, Ibaraki University, TAKASHI HONDA, KAZUTAKA IKEDA, Institute of Materials Structure Science, THOMAS HANSEN, Institut Laue-Langevin, TOSHIYA OTOMO, Institute of Materials Structure Science, HIDEO HOSONO, Tokyo Institute of Technology — Detailed knowledge of the phase diagram illustrating the superconducting (SC) and magnetic phases is essential for a deeper understanding of the physics in iron-based superconductors. Recently in the electron-doped LaFeAsO_{1-x}H_x [1], we found a two-SC-dome structure in $0.05 \leq x \leq 0.45$ and another antiferromagnetism (AFM) with a large moment and unique magnetic structure in over-doped region $x > 0.4$ [2]. However, due to the lack of the phase diagram of the SmFeAsO_{1-x}H_x particularly in the over-doped region, the relation between the high-Tc superconductivity and the magnetism is still unclear. Here, we present a complete phase diagram of SmFeAsO_{1-x}H_x with x ranging from 0 to 0.82 revealed by neutron diffraction and heat capacity measurements. We discovered a new AFM in the over-doped region, and the magnetic structure was incommensurate and predominantly longitudinal spin density wave. In this talk, we show the x - and temperature-dependence of magnetic and crystal structures in detail. [1] S. Iimura, et al., Nat. Commun. 3, 943 (2012). [2] M. Hiraishi et al., Nat. Phys. 10, 300 (2014).

SOSHI IIMURA
Tokyo Institute of Technology

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