

平成 30 年 6 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

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演題：Perovskite oxide heterostructures based on BaSnO₃

講師：Kookrin Char 氏

(Seoul National University・Professor)

日時：平成 30 年 6 月 28 日（木） 14:00～15:00

場所：北海道大学電子科学研究所セミナー室 1-3

主催：応用物理学会北海道支部

講演の要旨

A wide-bandgap perovskite oxide semiconductor BaSnO₃ was recently found to possess high mobility and excellent stability. Its single crystal mobility value of about 300 cm²/Vsec in the doping range of 10¹⁹~10²⁰/cm³, when n-type La dopants in place of Ba are used, is the highest among all the semiconductors. Furthermore, the oxygen diffusion constant in BaSnO₃ was measured to be several orders of magnitude lower than 3d transition metal perovskite oxides, demonstrating super stability of the material. Taking advantage of such properties, excellent field effect transistors were recently demonstrated using amorphous gate oxides (AlO_x and HfO_x) as well as high-k epitaxial gate oxides such as LaInO₃ and BaHfO₃, which led to the development of an all-perovskite transparent high mobility field effect transistor. In addition, p-type doping by K in place of Ba is feasible and the pn-junctions made with K-doped BaSnO₃ and La-doped BaSnO₃ were demonstrated to exhibit near-ideal IV characteristics. Moreover, 2DEG behavior is found at the polar interface of BaSnO₃ and LaInO₃. We will go over the parameters that control the 2DEG behavior and discuss the mechanism behind such behavior. In spite of these tremendous progresses, the device performances are currently limited by defects such as threading dislocations. Once all the

major defects are removed, the perovskite oxide semiconductor BaSnO₃ system, especially when it is combined with other perovskite oxides, is expected to offer much more opportunities for science and technology.

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