Growth and characterization of epitaxial SmB\textsubscript{6} thin films\textsuperscript{1} SE-UNGHUN LEE, XIAOHANG ZHANG, CNAM, Dept. Phys. and MSE, University of Maryland, DREW STASAK, Dept. MSE, University of Maryland, IFTEKHAR H. M. JAIM, CNAM, Dept. Phys. and MSE, University of Maryland, SHENG DAI, Dept. Chem. Eng. and Mater. Sci., University of California-Irvine, XIAOQING PAN, Dep. Chem. Eng. and Mater. Sci., and Dep. Phys. and Astro., University of California-Irvine, JAMES WILLIAMS, RICHARD L. GREENE, CNAM, Dept. Phys., University of Maryland, ICHIRO TAKEUCHI, CNAM, Dept. Phys. and MSE, University of Maryland — Samarium hexaboride (SmB\textsubscript{6}) is a topological Kondo insulator, and it is one of the most promising candidates for exploring exotic quantum states based on the topological surface state. We have previously observed the superconducting proximity effect in the surface state of SmB\textsubscript{6} at in-situ formed superconductor/SmB\textsubscript{6} thin film bilayer interfaces [Phys. Rev. X. 6, 031031 (2016)]. Here we present structural and electrical characteristics of epitaxial SmB\textsubscript{6} thin films prepared by co-sputtering of SmB\textsubscript{6} and B targets. The stoichiometry in SmB\textsubscript{6} thin film is carefully examined by WDS measurements. XRD phi-scan measurement reveals the epitaxial relation of SmB\textsubscript{6} thin film and substrate. Epitaxial SmB\textsubscript{6} thin films shows low-temperature resistance plateau attributed to the emergence of the surface state, consistent with many previous reports. We also discuss current research efforts with epitaxial SmB\textsubscript{6} thin films to realize topological superconductivity.

\textsuperscript{1}This work was supported by AFOSR (Grant No. FA9550-14-10332), NSF (Grant No. DMR-1410665), CNAM and Maryland NanoCenter.

Seunghun Lee
University of Maryland

Date submitted: 11 Nov 2016