Magnetic Properties of MnBi thin film grown by UHV sputtering

Hongjae Moon[1*], Sumin Kim[1], Min-jung Song[1], and Wooyoung Lee[1†]
[1]*Department of Materials Science and Engineering,*
Yonsei University, 262 Seongsanno, Seodaemun-gu, Seoul 120-749, Korea
[†]E-mail: wooyoung@yonsei.ac.kr

MnBi is a ferromagnetic intermetallic compound with a hexagonal NiAs structure and it is potentially used as a permanent magnet material. Over the last decades, MnBi has attracted research interests mainly due to its high magnetocrystalline anisotropy in low-temperature phase (LTP) and large Kerr rotation angle in quenched high temperature phase. The LTP MnBi has a larger coercivity than that of the Nd2Fe14B magnet at high temperature, showing high potential as a material that can be used in high temperature. We report MnBi intermetallic thin films with high coercivity prepared by multilayer deposition using UHV sputtering and annealing. The sputtering power and annealing temperature for maximizing the low-temperature phase structure was optimized. We obtained c-axis orientation of MnBi which is perpendicular to substrate by sputtering of Bi with the low deposition rate less than 3nm/s. We also optimized the synthesizing condition for LTP-MnBi by vacuum annealing of Bi/Mn multilayers at temperature of 350C for two hours. By observing SEM image, XRD analysis, and EDS analysis, the shape and constituent of MnBi thin film was observed.