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Nitrogen을 도핑시킨 Ge-Sb-Te 박막의 광전자 및 광흡수 분광학 연구

신현준¹, 정민철², 김민규¹, 이영미¹, 김기홍³, 정재관³, 송세안³, Zhimei Sun⁴

¹포항공과대학교, ²포항가속기연구소, ³일본오키나와연구소, ⁴삼성전자종합기술연구원, ⁵중국하문대학교

Nitrogen doped Ge-Sb-Te (N-GST) thin films for phase change random access memory (PRAM) applications were investigated by synchrotron-radiation-based x-ray photoelectron spectroscopy and absorption spectroscopy. Nitrogen doping in GST resulted in more favorable N atoms' bonding with Ge atoms rather than with Sb and Te atoms [1,2], which explains the higher phase change transition temperature than that of undoped Ge-Sb-Te thin film. Surprisingly, it was noticed that N atoms also existed in the form of molecular nitrogen, N₂, which is detrimental to the stability of the GST performance [3]. N-doped GST experimental features were also supported by ab-initio molecular dynamic calculations [2].

References

- [1] M.-C. Jung, Y. M. Lee, H.-D. Kim, M. G. Kim, and H. J. Shin, K. H. Kim, S. A. Song, H. S. Jeong, C. H. Ko, and M. Han, "Ge nitride formation in N-doped amorphous Ge₂Sb₂Te₅", Appl. Phys. Lett. 91, 083514 (2007).
- [2] Zhimei Sun, Jian Zhou, Hyun-Joon Shin, Andreas Blomqvist, and Rajeev Ahuja, "Stable nitride complex and molecular nitrogen in N doped amorphous Ge₂Sb₂Te₅", Appl. Phys. Lett. 93, 241908 (2008).
- [3] Kihong Kim, Ju-Chul Park, Jae-Gwan Chung, and Se Ahn Song, Min-Cherl Jung, Young Mi Lee, Hyun-Joon Shin, Bongjin Kuh, Yongho Ha, Jin-Seo Noh, "Observation of molecular nitrogen in N-doped Ge₂Sb₂Te₅", Appl. Phys. Lett. 89, 243520 (2006).

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