

PE-ALD of $\text{Ge}_{1-x}\text{S}_x$ amorphous chalcogenide alloys for OTS applications

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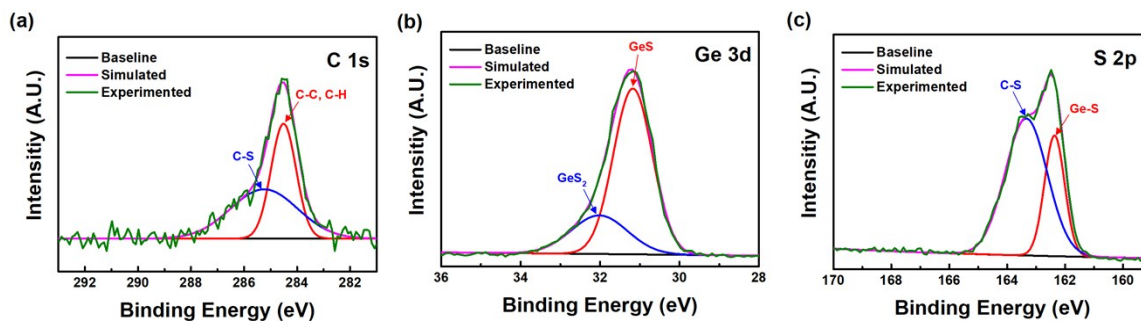


Figure S1. XPS results without surface etching of PE-ALD $\text{Ge}_{1-x}\text{S}_x$ thin film at 70 °C (a) C 1s, (b) Ge 3d, and (c) S 2p. XPS results shows the binding energies of C-S bond located at approximately 285.5 eV and 163.7 eV in Figure S1(a) and Figure S1(c), respectively.¹ Moreover, in Figure S1(b), two peaks were observed with GeS_2 (~32.2 eV) and GeS (~30.9 eV).² This XPS result supports the explanation for the compositional change of surfaces compared to the bulk, which is similarly shown in Figure 3 (b-d).

Reference

- 1 A. Vesel, J. Kovac, G. Primc, I. Junkar and M. Mozetic, *Materials*, 2016, 9, 95–108
- 2 H. Chen, C. Keiser, S. Du, H. J. Gao, P. Sutter and E. Sutter, *Phys. Chem. Chem. Phys.*, 2017, 19, 32473–32480.

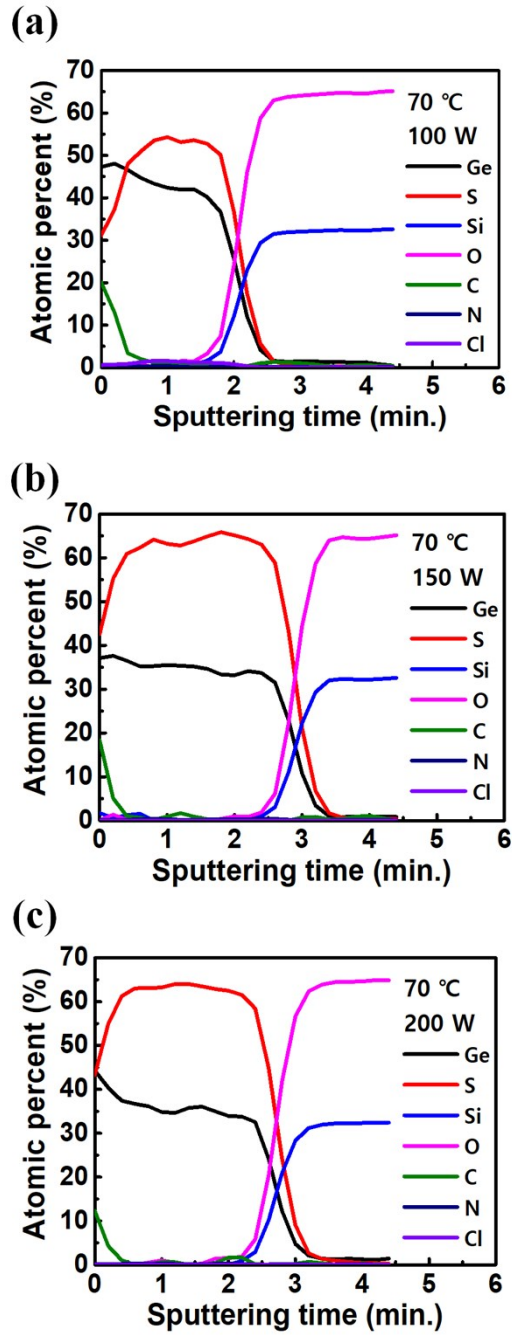


Figure S2. AES depth profile analysis of PE-ALD $\text{Ge}_{1-x}\text{S}_x$ thin films as a function H_2S reactant plasma power at a growth temperature of 70 °C and: (a) 100 W; (b) 150 W; (c) 200 W.

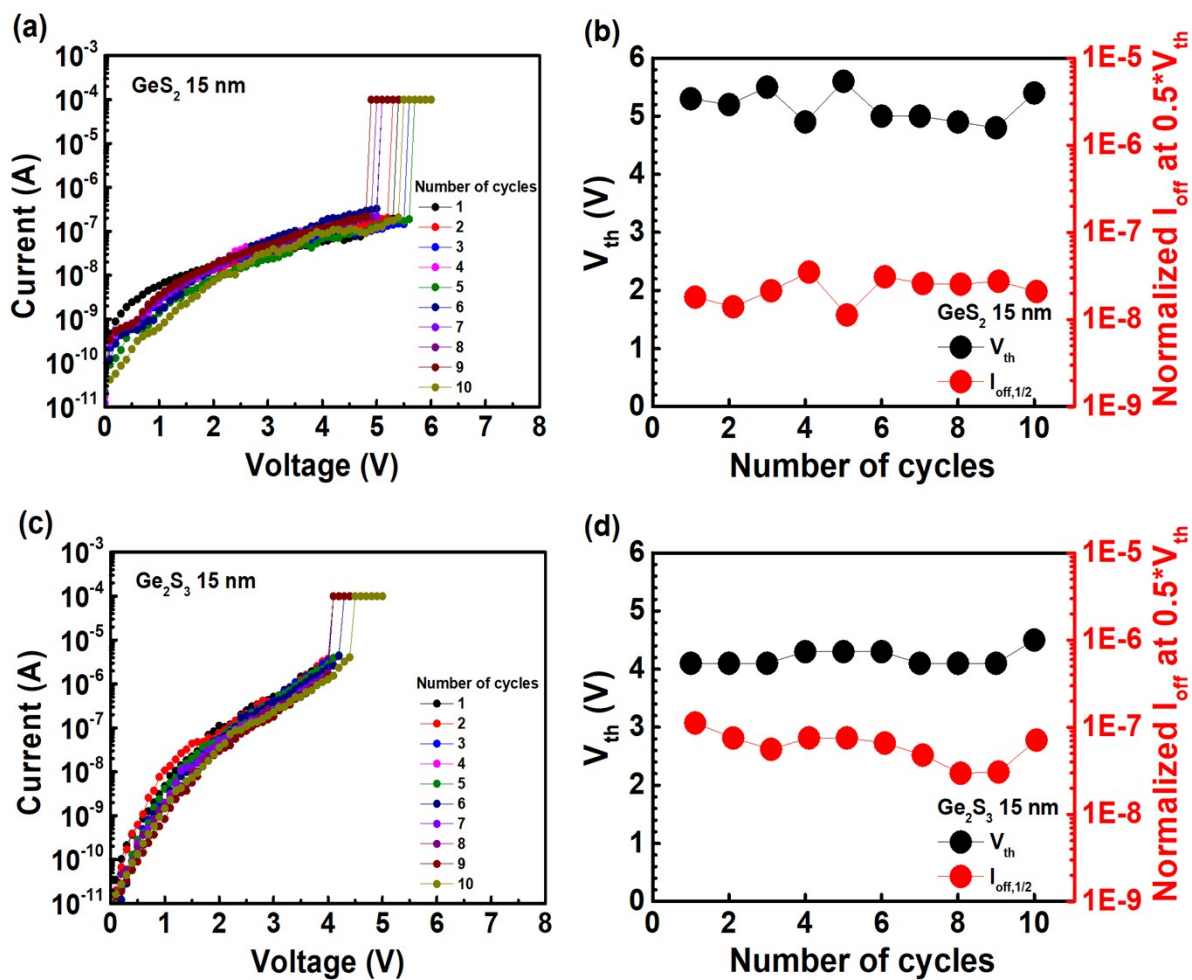


Figure S3. Repeatability characteristics of PE-ALD 15-nm-thick GeS_2 and Ge_2S_3 OTS devices: (a) cyclic DC I-V curves of GeS_2 ; (b) repeatability of V_{th} and $I_{off,1/2}$ of GeS_2 ; (c) cyclic DC I-V curves of Ge_2S_3 ; (d) repeatability of V_{th} and $I_{off,1/2}$ of Ge_2S_3