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The crystallization of GeSbTe-SbTe thin film combinations on Si(001)

이상엽¹, 배병택¹, 이규민², 안영근¹, 장민영¹, 백주혁¹, 김현종¹, 조만호¹, 정광호¹

¹연세대학교 물리학과, ²연세대학교 세라믹공학과

The crystallizations of $\text{Ge}_2\text{Sb}_2\text{Te}_5\text{-Sb}_2\text{Te}_3$ (GST-ST) chalcogenide thin film combinations on wet oxide Si(001), which were prepared by thermal deposition, were studied. The samples were deposited as GST92nmST27nm, GST60nmST61nm, GST28nmST92nm, ST61nmGST60nm and GST36nmST27nm on the substrate. XRD pattern was measured from 15 to 65 at different temperatures from room temperature to 400°C. The temperature elevated XRD showed the distinct crystallizations compared with cases of $\text{Ge}_2\text{Sb}_2\text{Te}_5$, Sb_2Te_3 and GeTe. The crystallinities of GST-ST samples were changed due to the thickness of Sb_2Te_3 lower layer. In the case of lower layer with $\text{Ge}_2\text{Sb}_2\text{Te}_5$ for ST-GST thin film combination, the crystallization at the as-grown state was not observed. The different interfacial layer formation between GST and ST layers are also expected. The differences of the energies for crystallization and the initial layer formation with wet oxide Si(001) substrate of GST and ST can be the reason for these results. From this above, the thickness and the layered sequence dependent crystallizations were concluded in the chalcogenide thin film combinations at different temperatures.