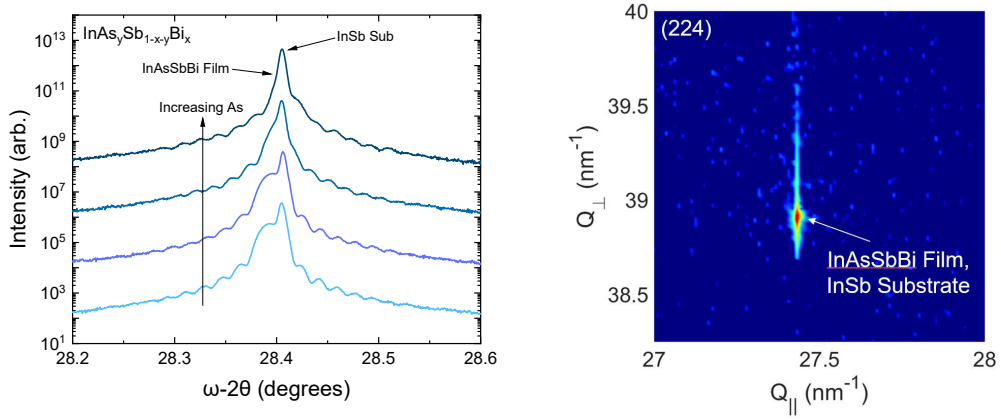

Fig. 1 (a) X-ray diffraction ω-2θ scans of InAsSbBi films about the (004) peak of InSb demonstrate a shift to larger angles with increasing As enabling lattice-matching of InAsSbBi to InSb. **(b)** A (224) reciprocal space map of InAsSbBi on InSb not only confirms lattice-matching, but also rules out phase separation or relaxation in the film.

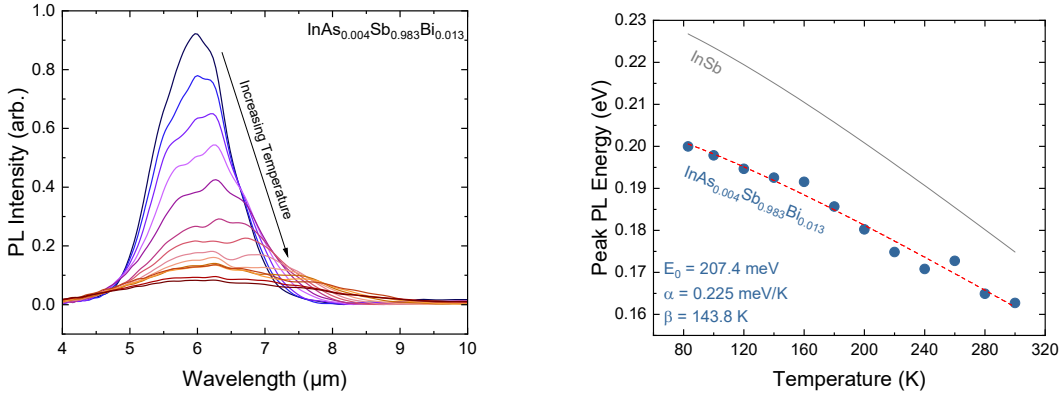

Fig. 2 (a) Temperature-dependent photoluminescence measurements of lattice-matched InAsSbBi demonstrate decreasing energy with increasing temperature consistent with an interband transition. **(b)** A Varshni fit to the PL data yields reasonable α and β parameters as compared with established value for InSb[1] (gray).

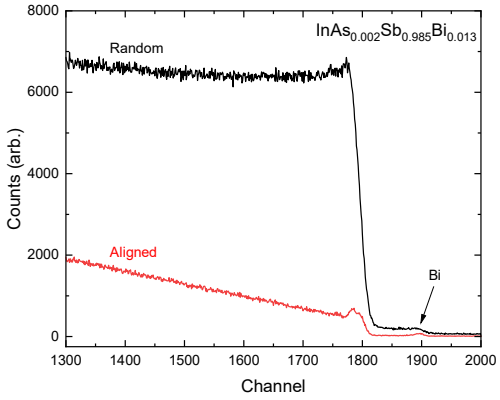

Fig. 3 Rutherford backscattering spectrometry measurements oriented on random and aligned crystallographic directions demonstrated highly substitutional Bi incorporation in the film of ~95%.

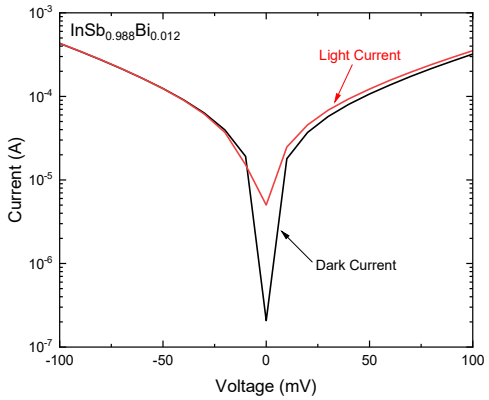

Fig. 4 Light and dark lamp I-V characteristics of an undoped InSbBi photodetector show an increase in current under illumination indicative of photodetection.

[1]H. Casey, Jr. and M. Panish, *Heterostructure Lasers* (1978).