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Measurement of surface acoustic wave velocity using phase shift mask and application on thin film of thermoelectric material DONGYAO LI, Department of Materials Science and Engineering, Materials Research Laboratory, University of Illinois, PENG ZHAO, Department of Material Science and Engineering, The Ohio State University, NOEL GUNNING, DAVID JOHNSON, Department of Chemistry and Biochemistry, University of Oregon, JI-CHENG ZHAO, Department of Material Science and Engineering, The Ohio State University, DAVID CAHILL, Department of Materials Science and Engineering, Materials Research Laboratory, University of Illinois — We describe a convenient approach for measuring the velocity v_{SAW} of surface acoustic waves (SAWs) of the near-surface layer of a material through optical pump-probe measurements and apply this method, in combination with conventional picosecond acoustics, to determine a subset of the elastic constants of thin films of semiconducting misfit layered compounds. SAWs with a wavelength of 700 nm are generated and detected using an elastomeric polydimethylsiloxane (PDMS) phase-shift mask which is fabricated using a commercially-available Si grating as a mold. The velocity of SAWs of $[(SnSe)_{1.04}]_m[MoSe_2]_n$ synthesized by elemental reactants show subtle variations in their elastic constants as a function of m and n. Precise measurements of elastic constants will enable a better understanding of interfacial stiffness in nanoscale multilayers and the effects of phonon focusing on thermal conductivity.

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