Abstract Submitted
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High temperature cross-plane Seebeck coefficient measurement of ErAs:InGaAs/InGaAlAs superlattice[1] ZHIXI BIAN, MONA ZEBARJADI, ALI SHAKOURI, University of California, Santa Cruz, GEHONG ZENG, University of California, Santa Barbara, JOHN BOWERS — The 3ω technique is used to measure the Seebeck coefficient across 2.4 micron superlattices made of $80\times((\mathrm{InGaAs})_{0.6}(\mathrm{lnAlAs})_{0.4}$ -10nm / InGaAs-20 nm) films lattice matched to InP substrate. ErAs nanoparticles are randomly distributed inside the 20 nm InGaAs layer. We characterized 4 samples with different doping concentrations (from 2×10^{18} cm^{-3} to $10^{19}\mathrm{cm}^{-3}$) in a temperature range of 300K to 600 K. A significant increase in the cross plane Seebeck coefficient compared to the in plane one is observed. Comparison with DC measurement shows that the 3ω method is more accurate especially at high temperatures. Theoretical analysis based on the solution of the coupled Schrödinger and Poisson equations, together with modified Boltzmann transport equation is used to explain the experimental results.

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