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Thermoelectric Properties of MOVPE Grown AlInN, Lattice-Matched to GaN JING ZHANG, HUA TONG, GUANGYU LIU, JUAN HERB-SOMMER, GENSHENG HUANG, NELSON TANSU, Lehigh Univ. — In this work, we investigate experimentally the growth and thermoelectric properties, i.e., thermal conductivity, Seebeck coefficient, and electrical conductivity, of n-type wurtzite high quality $\text{Al}_x\text{In}_{1-x}\text{N}$, grown on GaN template on sapphire substrate by MOVPE, in-plane lattice-matched to GaN. The thermal conductivity is measured by 3ω method differential technique for thin films. The thermal conductivity value of $\text{Al}_{0.83}\text{In}_{0.17}\text{N}$ is measured as $5.7 \text{ W}/(\text{mK})$. The Seebeck coefficient is calculated as the ratio of measured voltage difference and temperature difference when a temperature gradient is created in the sample. The absolute Seebeck coefficient value of $\text{Al}_{0.83}\text{In}_{0.17}\text{N}$ is measured as $6.2 \times 10^{-4} \text{ V/K}$. The sheet resistivity of lattice-matched $\text{Al}_{0.83}\text{In}_{0.17}\text{N}$ is measured using Van der Pauw scheme and the electric conductivity is acquired accordingly to be $2.9 \times 10^4 /(\Omega.\text{m})$. The Z^*T value of $\text{Al}_{0.83}\text{In}_{0.17}\text{N}$ obtained is above 0.2 at room temperature. The results indicate AlInN based alloys are good candidates for thermoelectric devices.

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