Electronic supplementary information

Thermal Phonon Mechanism of Amorphous AlN and Thermal Transport of Thin Amorphous Layers at the Interface

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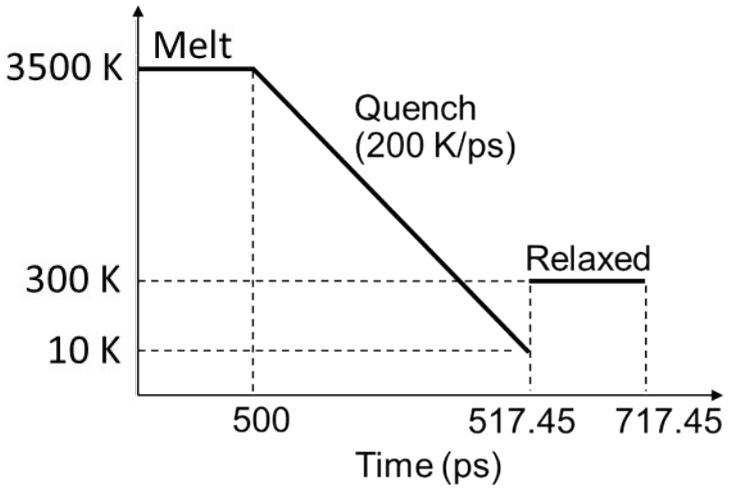

Figure S1. Process of Melt-Quenching method for constructing amorphous materials.

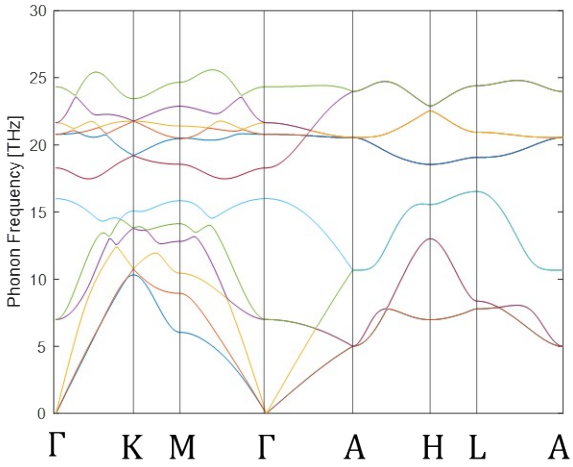

Figure S2. Phonon dispersion curve of c-AlN.

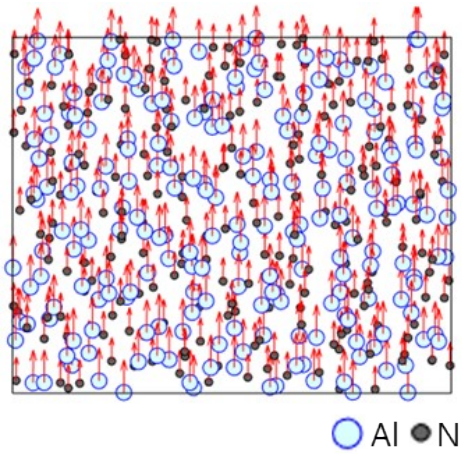

Figure S3. Spatial components of the two-dimensional phonon modes less than 1THz in a-AlN. (Red arrow shows the preferred direction and relative magnitude of phonon modes.)

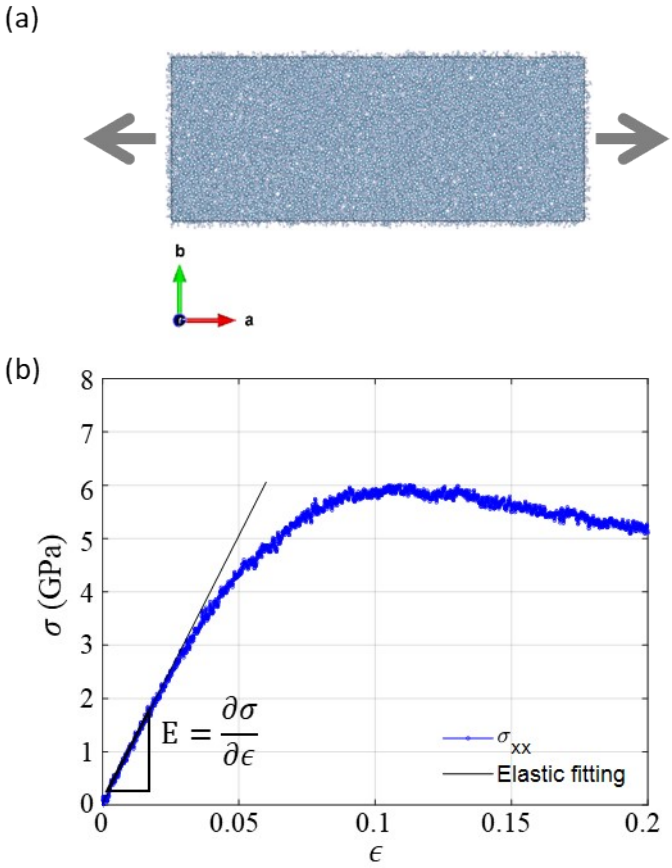

Figure S4. (a) Schematic atomic model for tensile stress and (b) stress (σ)-strain (ϵ) curve of a-AlN.

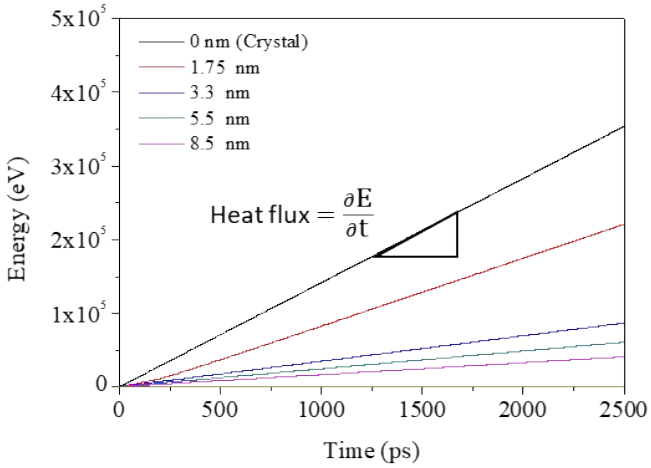

Figure S5. Energy vs. Time depending on the thickness of a-AlN in the composite models.

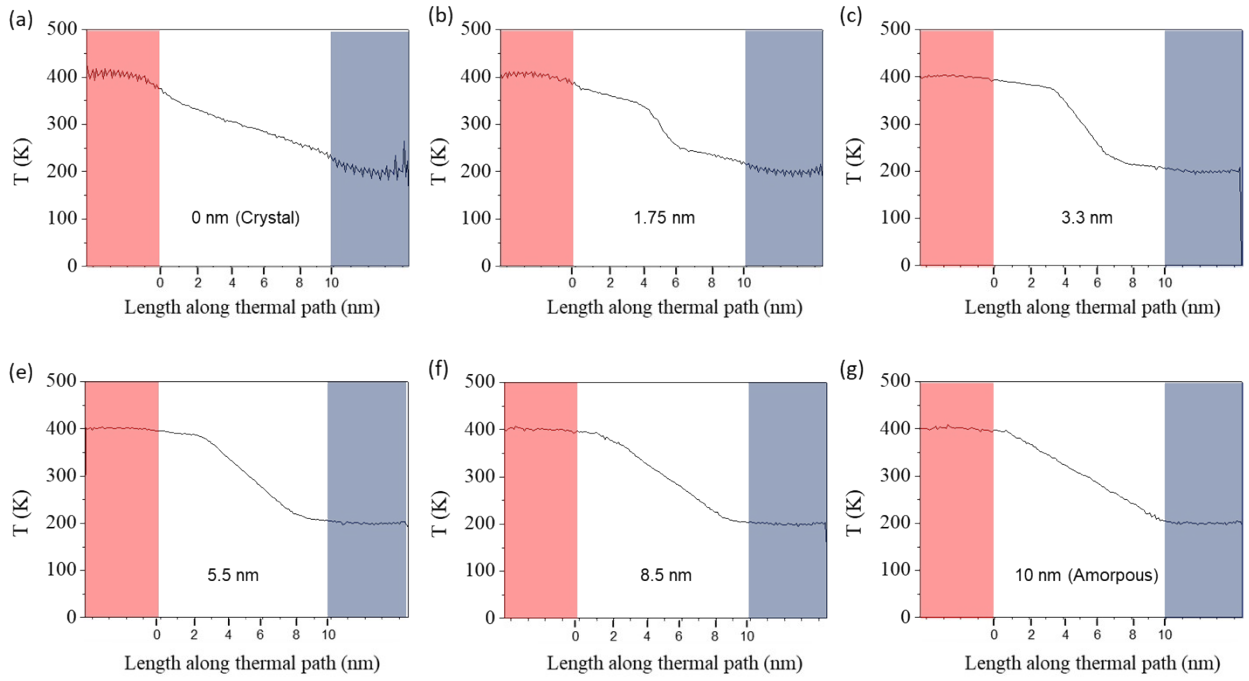

Figure S6. Temperature (T) gradient of the composite models of c-AlN/a-AlN/c-AlN of case 1 with different thickness layers of amorphous AlN of (a) 0 nm, (b) 1.75 nm, (c) 3.3 nm (d) 5.5 nm, (e) 8.5nm and (g) 10 nm.

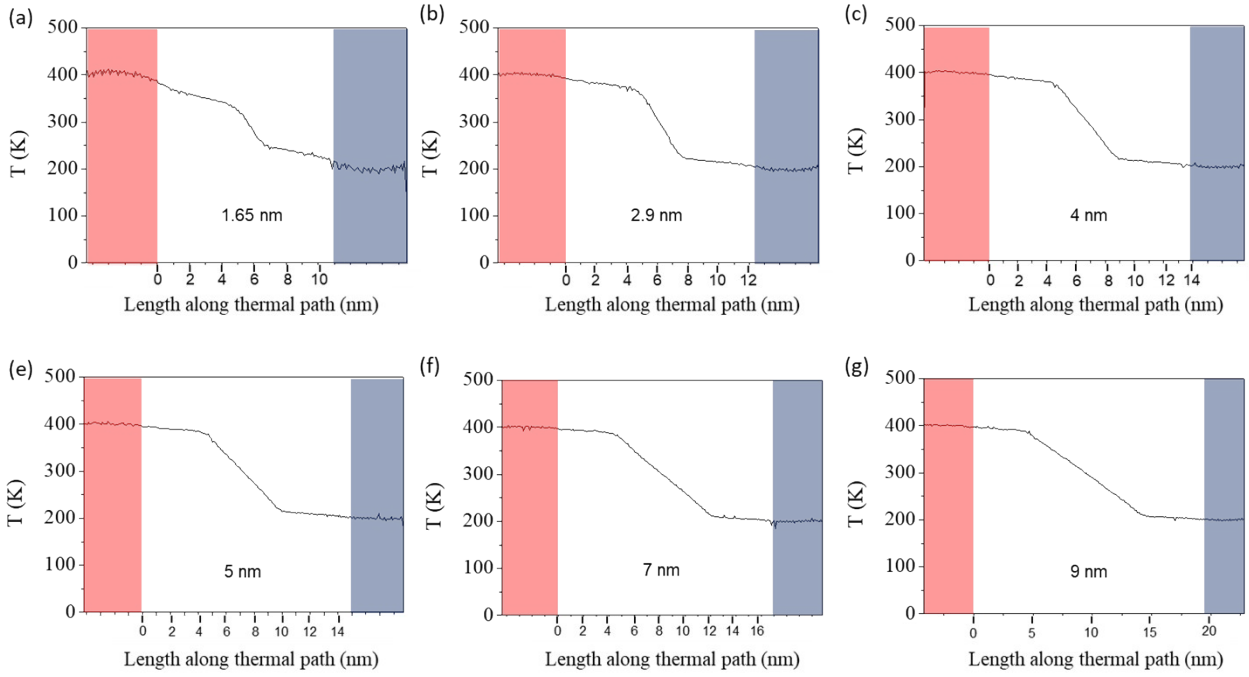

Figure S7. Temperature (T) gradient of the composite models of c-AlN/a-AlN/c-AlN of case 2 with different thickness layers of amorphous AlN of (a) 1.65 nm, (b) 2.9 nm, (c) 4 nm (d) 5 nm, (e) 7 nm and (g) 9 nm.

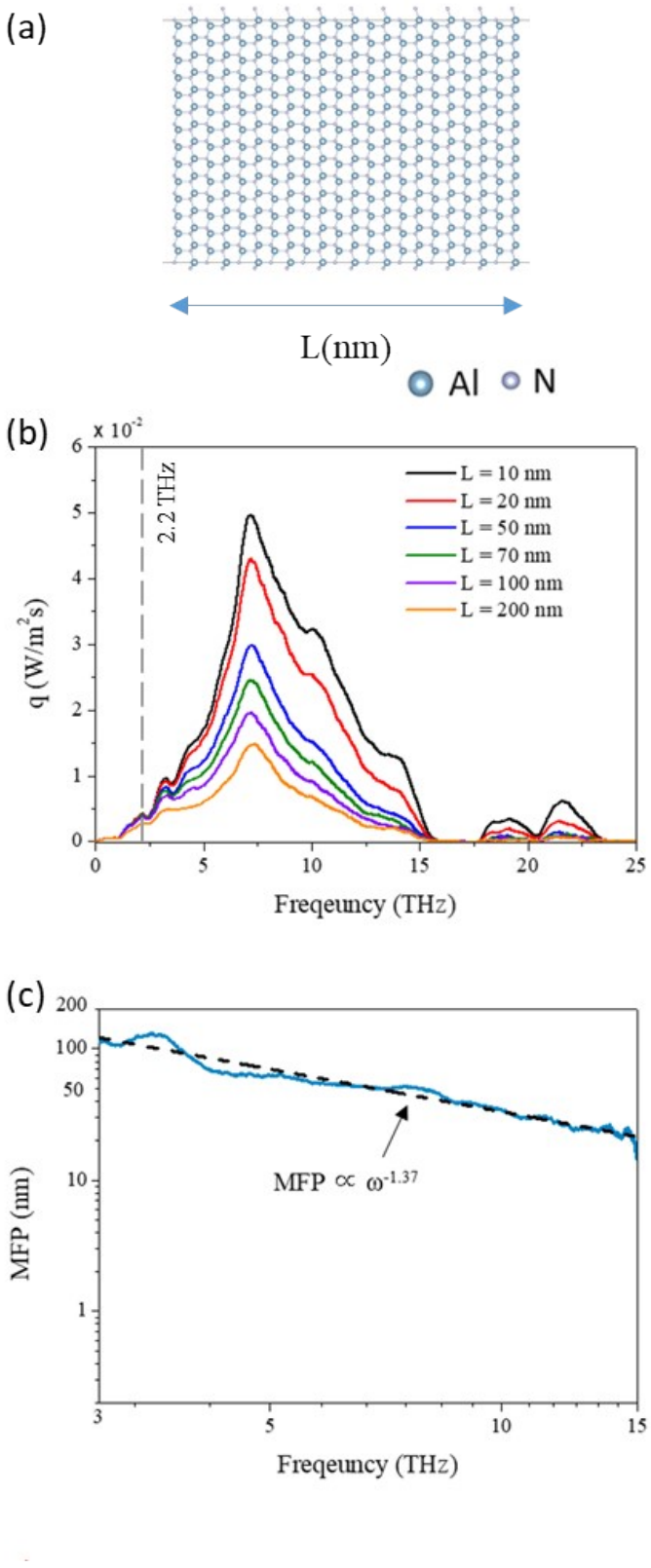

Figure S8. (a) Atomic model, (b) heat flux (q) and (c) Mean free path (MFP) of c-AlN.

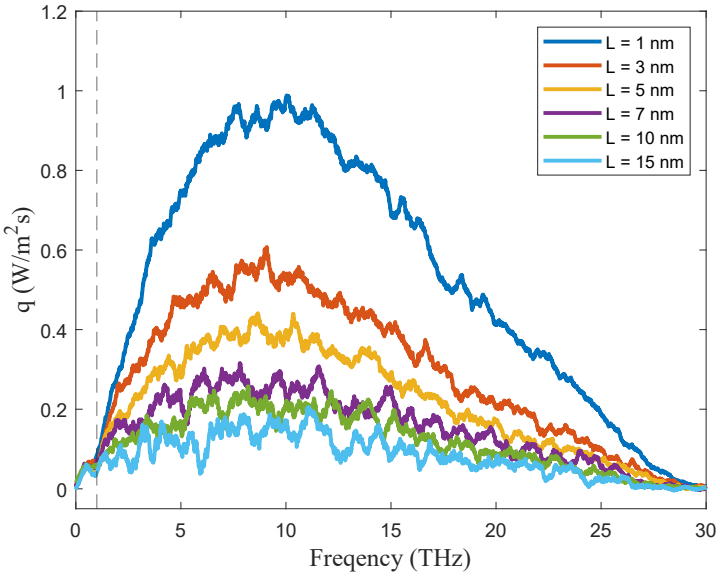

Figure S9. Heat flux (q) of a-Al_2O_3.

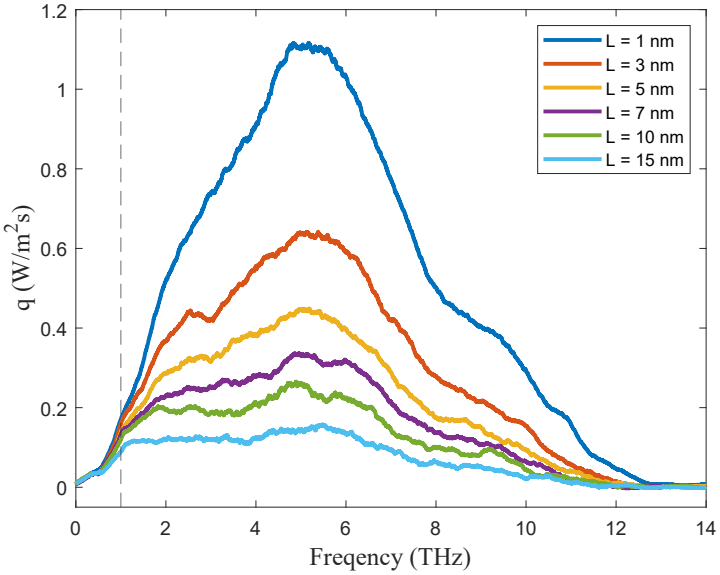

Figure S10. Heat flux (q) of a-GaN.

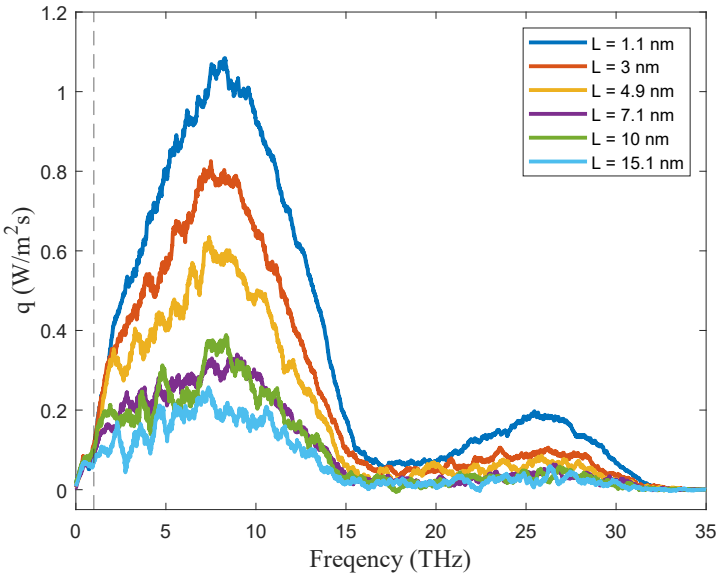

Figure S11. Heat flux (q) of a-SiC.

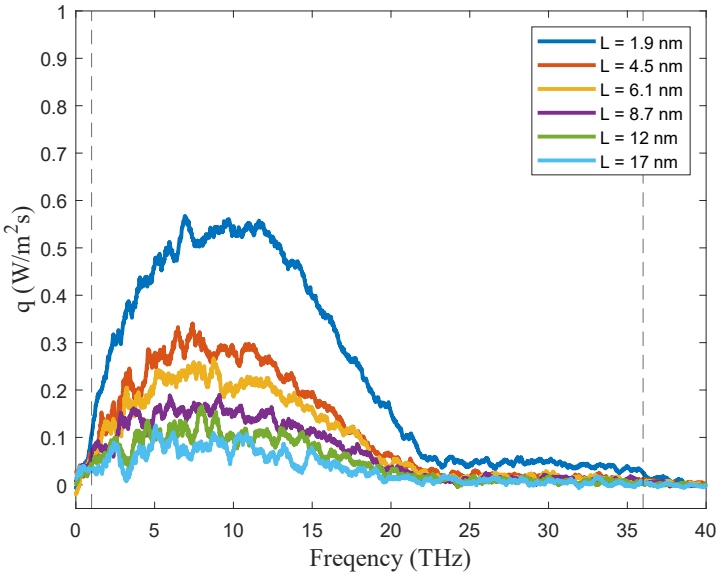

Figure S12. Heat flux (q) of a-Si_3N_4.