Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Tunable Thermal Conductivity of Thin Films of Polycrystalline AlN by Structural Inhomogeneity and Interfacial Oxidation

J. Jaramillo-Fernandez [a], J. Ordonez-Miranda [b], E. Ollier [a] and S. Volz [b*]

[a] Laboratoire de Récupération des Micro-énergies LITEN/DTNM/SERE, CEA, 38000 Grenoble, France.

[b] Laboratoire d'Énergétique Moléculaire et Macroscopique, Combustion, UPR CNRS 288, Ecole Centrale Paris, Grande Voie des Vignes, 92295 Châtenay Malabry, France.

*** Corresponding author**

Email: sebastian.volz@ecp.fr

Phone: +33 1 41 13 10 70

Supplementary Material.

XRD θ–2θ scan patterns (in logarithmic scale) of the AlN films performed at a zoomed 2θ angle range, from 34° to 38°. The slight (002) peak shift towards higher angles when increasing film thickness can be clearly observed by plotting the logarithm of the relative diffracted intensity as a function of the 2θ angle, from 34° to 38°. The thickness dependent 2θ angle varies from 35.8° to 36.04° for monolayer films, with thicknesses varying from 270nm to 1460nm. The same 2θ angle shift is observed for multilayer films of thicknesses varying from 270nm to 1107nm. This slight (002) peak shift towards higher angles when increasing film thickness results from the strain relaxation mechanisms occurring through the cross-plane[1].

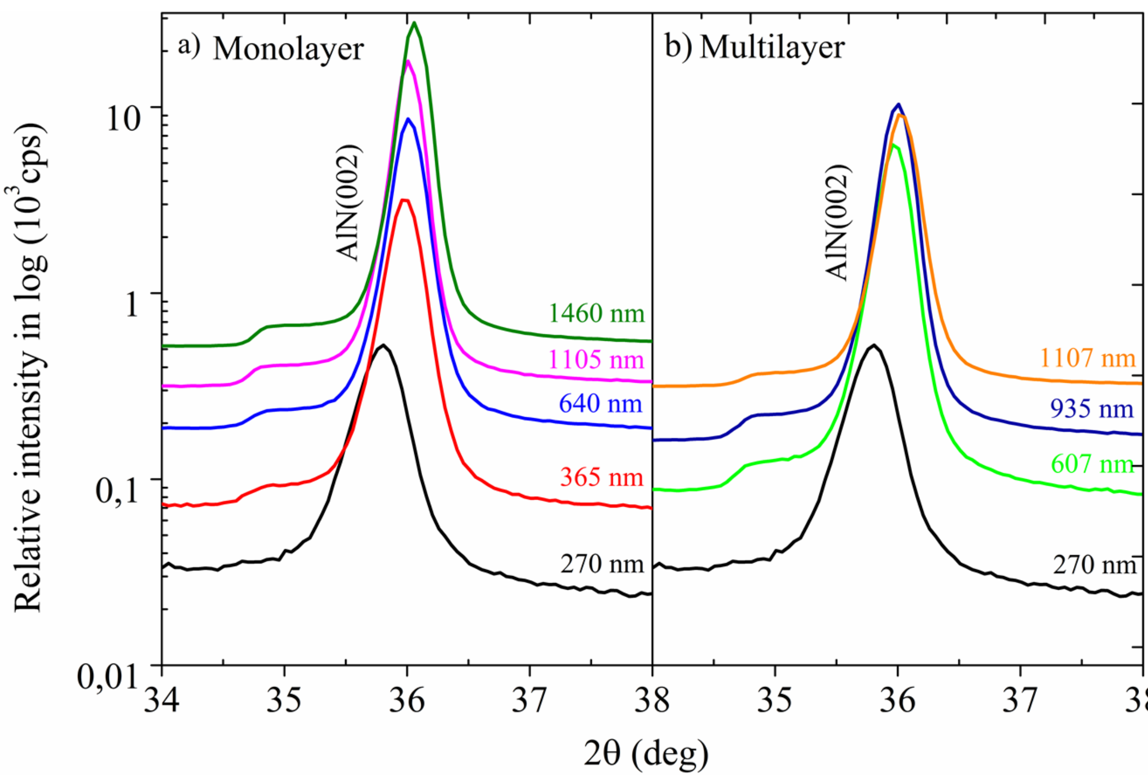

Fig. S1. XRD θ–2θ scan patterns (in logarithmic scale) of the AlN a) monolayer and b) multilayer films of different thicknesses. For both monolayer and multilayer configurations, a (002) peak shift from 2θ = 35.8° to 36.04° is observed as a result of the strain relaxation mechanisms occurring through the cross-plane[1].

TEM Fast Fourier transform pattern of Si(100)

Fig. S2 show the typical pattern of crystalline (100) Si which agree with the literature [2]. The FFT pattern obtained from a cross sectional HRTEM micrograph of the Si/AlN interface, captured with the electron beam parallel to the [0 1 1] Si zone axis.

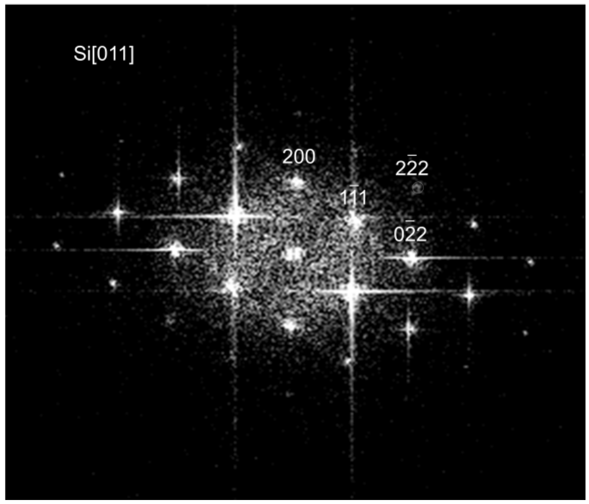

Fig. S2. Fast Fourier transform pattern from (100) single crystal silicon obtained from a cross sectional HRTEM micrograph of the Si/AlN interface, captured with the electron beam parallel to the [011] zone axis.

1 References

1. V. Darakchieva, J. Birch, M. Schubert, T. Paskova, S. Tungasmita, G. Wagner, A. Kasic and B. Monemar, *Phys. Rev. B*, 2004, **70**, 0454111–04541110.

2. A. Galca, G. Stan, L. Trinca, C. Negrila and L. Nistor, *Thin Solid Films*, 2012, **524**, 328–333.