



Standard specifications of Si-based AlN templates

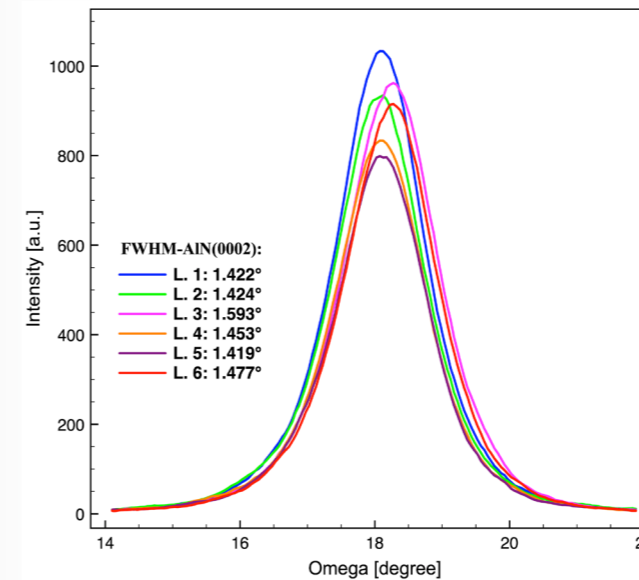
At present, Ultratrend Technologies Co.,Ltd. (UTC) can provide standardized 4/6/8 inch high-quality Si-based AlN templates, which are ideally suited as substrate for high-power/high-frequency electronic devices (such as 5G SAW/BAW devices).

Characteristic	Specification		
Model	UTI-AIN-100S	UTI-AIN-150S	UTI-AIN-200S
Substrate	C-plane of Si single crystal wafer		
Conductivity Type	N/P		
Resistivity Type (Ω)	>5000		
AlN structure	Wurtzite		
Diameter (inch)	4	6	8
Substrate thickness (μm)	525 \pm 20	625 \pm 15	725 \pm 15
AlN Film thickness (nm)	200/400/500/600/800/1000 (Technical specs may vary with AlN film thickness, hereby taking 500nm as an example)		
Orientation	C-axis [0001] +/- 0.2°		
Usable Area	$\geq 95\%$		
Cracks	None		
FWHM-2 θ XRD@(0002)	$\leq 0.2^\circ$		
FWHM-HR-XRD@(0002)	$\leq 1.55^\circ$		
Surface Roughness [5 \times 5 μm] (nm)	≤ 2.0		
TTV (μm)	≤ 10	≤ 5	≤ 4
Bow (μm)	≤ 25	≤ 40	≤ 40
Warp (μm)	≤ 25	≤ 40	≤ 40
Packaging	Single / Multi wafer cups		

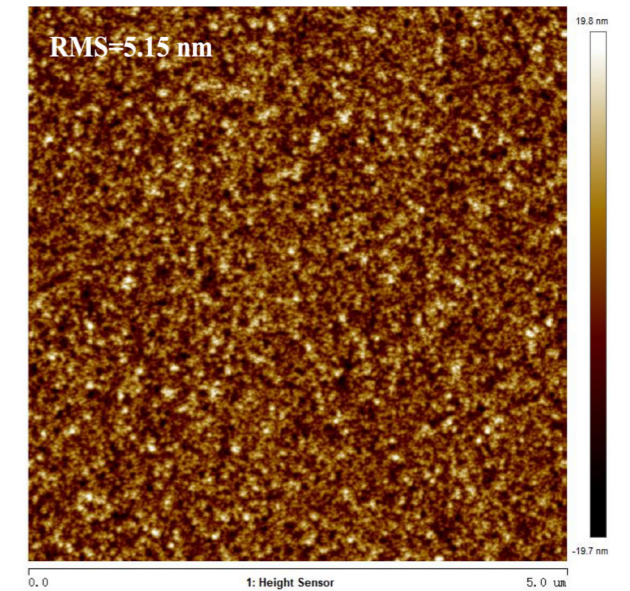
Note: These characterization results may vary slightly depending on the equipments and/or software employed



Characterization results of Si-based AlN templates



FWHMs of AlN(0002) by HRXRD



AFM images of Si-based AlN templates



Applications of Si-based AlN template



Silicon-based semiconductor technology has reached its limits and could not satisfy the requirements of future electronic devices. As a typical kind of 3rd/4th-generation semiconductor material, aluminum nitride (AlN) has superior physical and chemical properties such as wide bandgap, high thermal conductivity, high breakdown field, high electronic mobility and corrosion/radiation resistance, and is a perfect substrate for optoelectronic devices, radio frequency (RF) devices, high-power/high-frequency electronic devices, etc.. Particularly, AlN substrate is the best candidate for UV-LED, UV detectors, UV lasers, 5G high-power/high-frequency RF devices and 5G SAW/BAW devices, which could widely be used in environmental protection, electronics, wireless communications, printing, biology, healthcare, military and other fields, such as UV purification/sterilization, UV curing, photocatalysis, counterfeit detection, high-density storage, medical phototherapy, drug discovery, wireless and secure communication, aerospace/deep-space detection and other fields.

Ultratrend Technologies Co.,Ltd. (UTC) has developed a series of proprietary processes and technologies to fabricate high-quality AlN templates. At present, UTC is the only company worldwide who can produce 4/6/8 inch AlN templates in large-scale industrial production capability with capacity of 300,000 pieces in 2020 to meet explosive market demand from UVC-LED, 5G wireless communication, UV detectors and sensors etc..