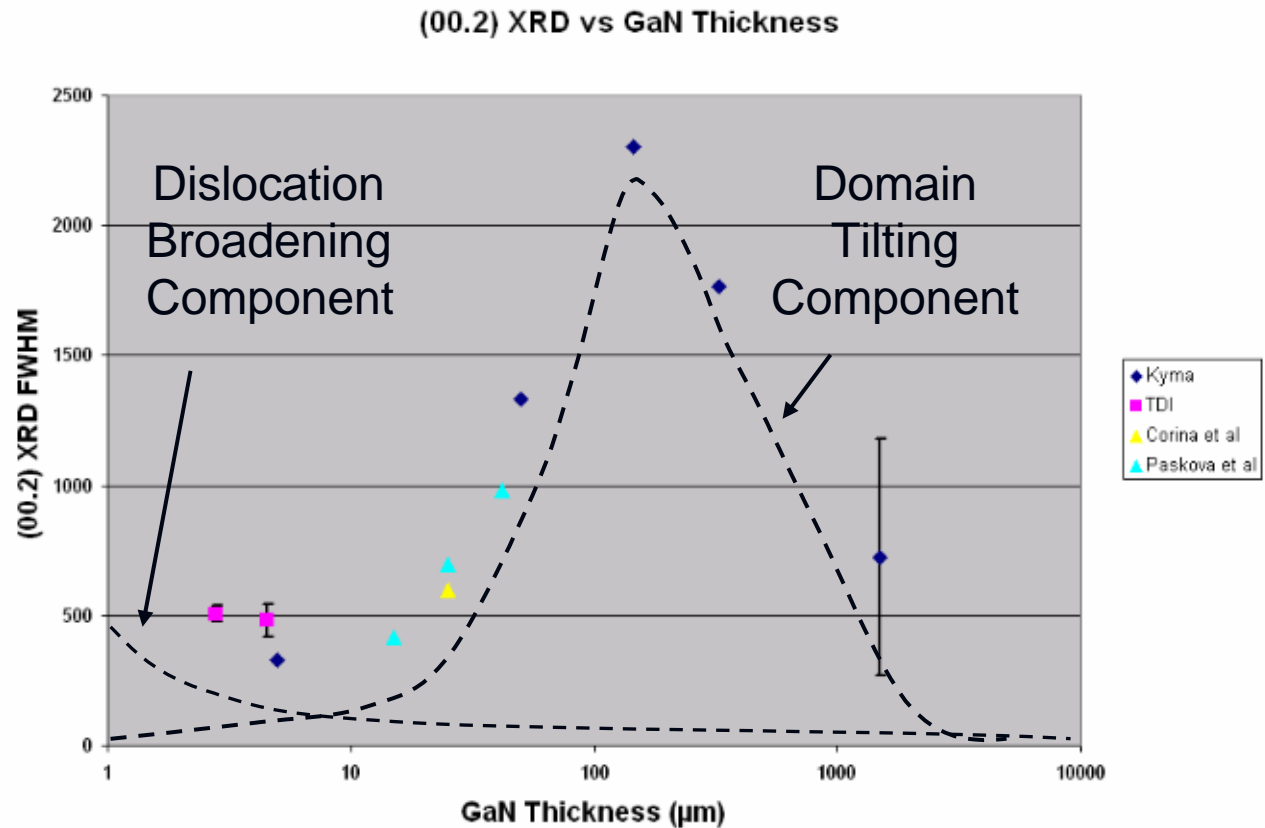


GaN Domains and XRD



Domains form during thick GaN growth which broaden the x-ray spectra

- „ Other group results identical to us
- „ Domain tilting maximum is around 100-500μm
- „ Dislocation density continues to drop and quality continues to improve, even though the XRD degrades due to the domain tilting

HVPE Template Data

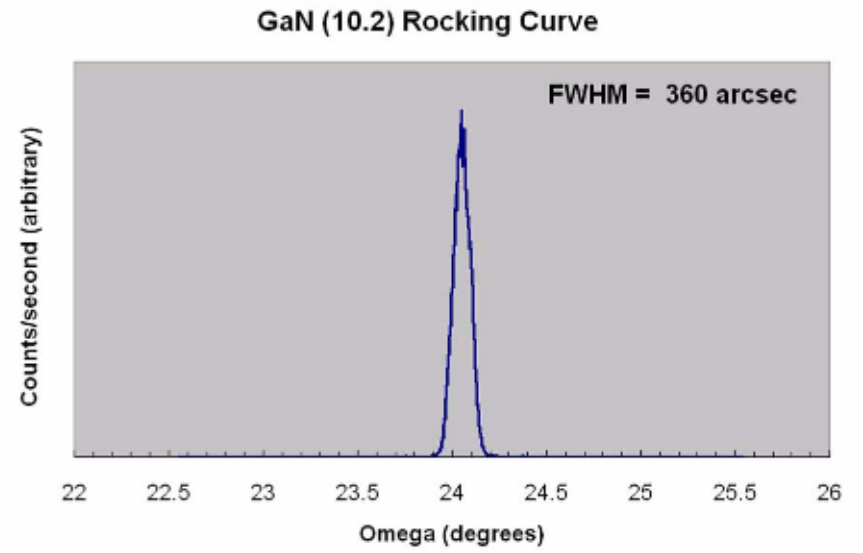
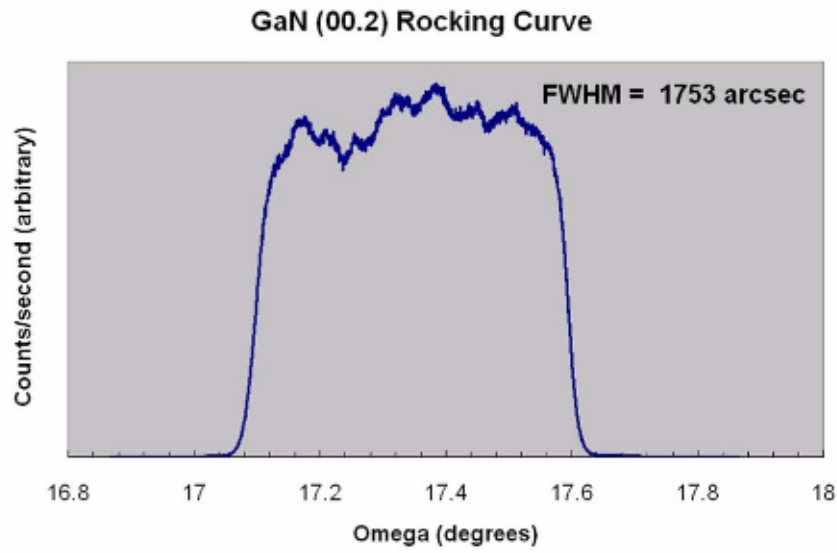
”

Source	Thickness	(00.2) XRD FWHM	Reference
TDI	2.8 μm	506”	
Paskova/ Monemar et al	15-40 μm	418-983”	
Corina et al	25 μm	600”	

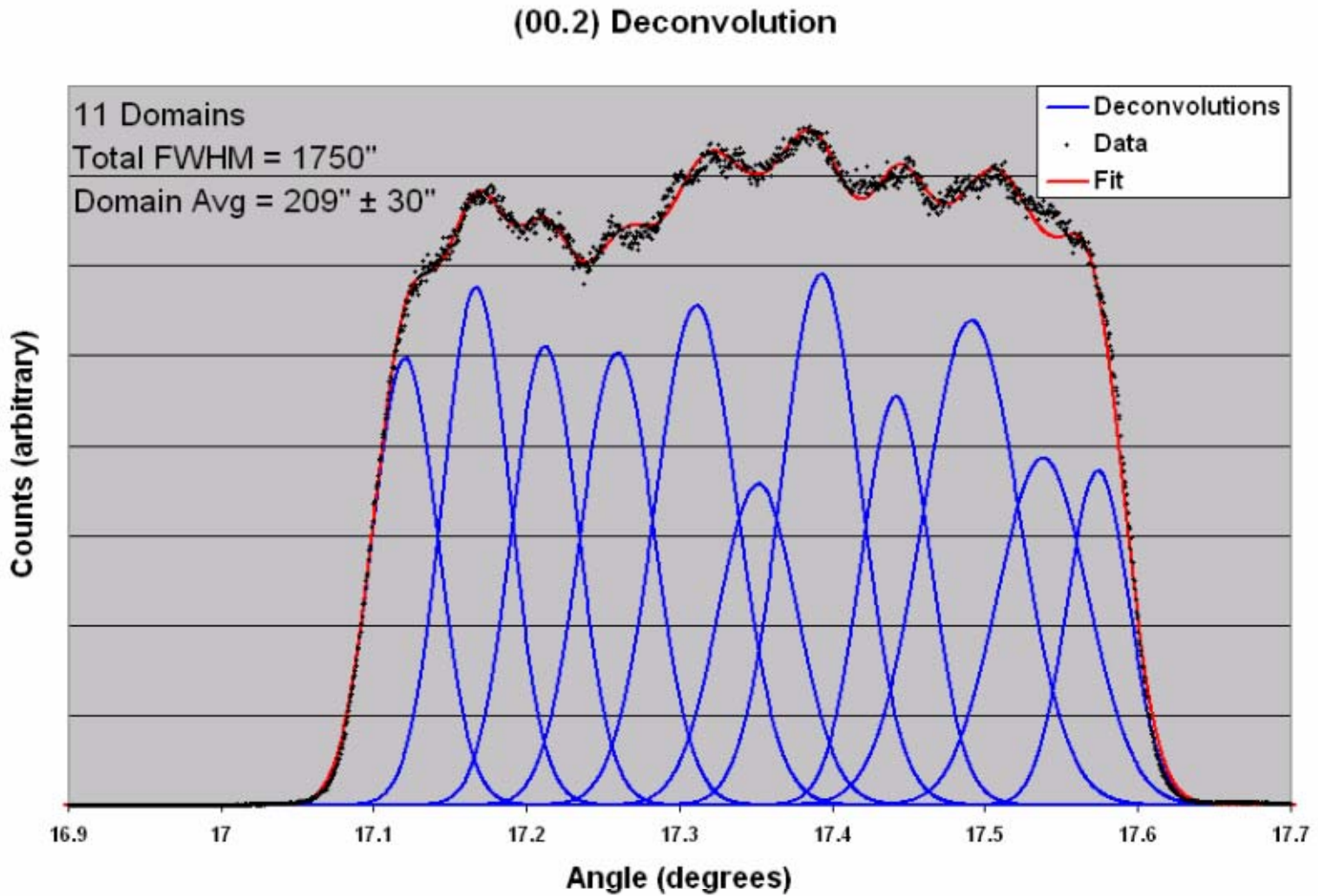
Why X-ray FWHM is Large

- „ Rocking curve broadening components
 - „ #1 effect = Domains
 - „ #2 effect = Dislocation Broadening
 - „ #3 effect = Wafer Bow
- „ On axis (00.2) scans broad (usually $\gg 200''$)
 - „ Domains manifest in plane
- „ Off axis (10.2) often more narrow ($\sim 300''$)
 - „ Low dislocation density (which is what is important)
 - „ Not always narrow, but this does illustrate the nature of domains

(00.2) and (10.2) XRD 350 μ m Uncracked Template



Deconvolution of (00.2) Peaks



Conclusions

- „ Room temperature rocking curve is not indicative of the dislocation density
 - „ RT rocking curve is influenced by several factors
 - „ Bending, domains, and dislocations all contribute

Data via TEM, Micro CL, Etching studies and many other techniques categorically prove low defect density

To date, “domains” have not been shown to significantly effect device results.

- „ An effect must be present at some level, but it appears to be 2nd or 3rd order compared to current device issues