

Russian Samples

- Mamaev reported “World Record” 91.5% polarization and 0.85% QE @830 nm in December 20006. (Wafer 7-307)
- Same structure was grown on a Bragg reflector in hopes of achieving world highest polarization and QE. (Wafer 7-308)
- Mamaev sent us two test samples,
 - 7-307 1 cm x 1 cm
 - 7-308 ¼ of 3” wafer
- X-rayed un-used samples
- QE/polarization measurements

Structures

- 7-307

- GaAs cap 6 nm Be: 7×10^{18}
- $\text{Al}_{0.39}\text{Ga}_{0.61}\text{As}$ 2.1 nm
- $\text{In}_{0.2}\text{Al}_{0.2}\text{Ga}_{0.6}\text{As}$ 5.4 nm
 - Repeat x12 Be: 3×10^{17}
- $\text{Al}_{0.35}\text{Ga}_{0.65}\text{As}$ 0.3 μm
- GaAs buffer 0.2 μm
- GaAs s.i. substrate

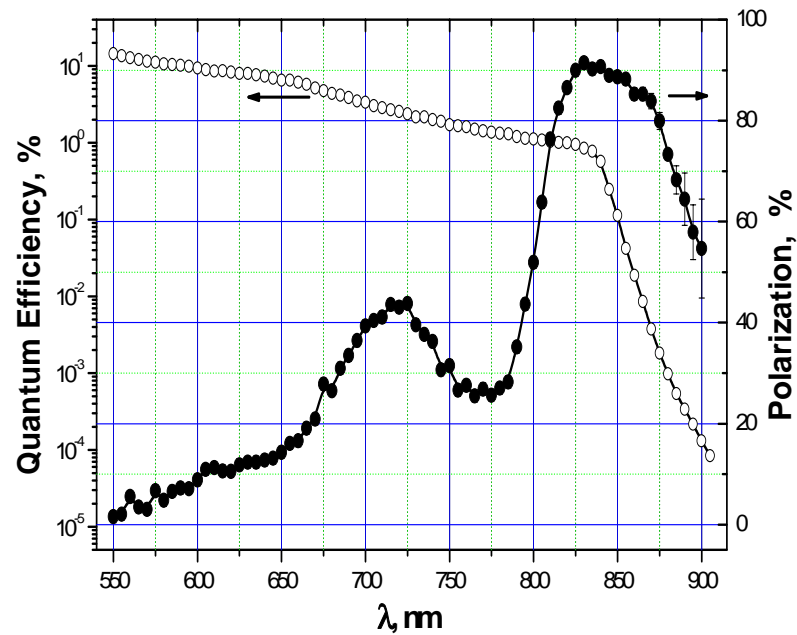
- 7-308

- GaAs cap 6 nm Be: 7×10^{18}
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- $\text{In}_{0.2}\text{Al}_{0.2}\text{Ga}_{0.6}\text{As}$ 5.4 nm
 - Repeat x12 Be: 3×10^{17}
- $\text{Al}_{0.35}\text{Ga}_{0.65}\text{As}$ 0.3 μm
- GaAs buffer 12 nm
- GaAs buffer 20 nm
- DBR (AlGaAs/GaAs superlattice)
- GaAs substrate

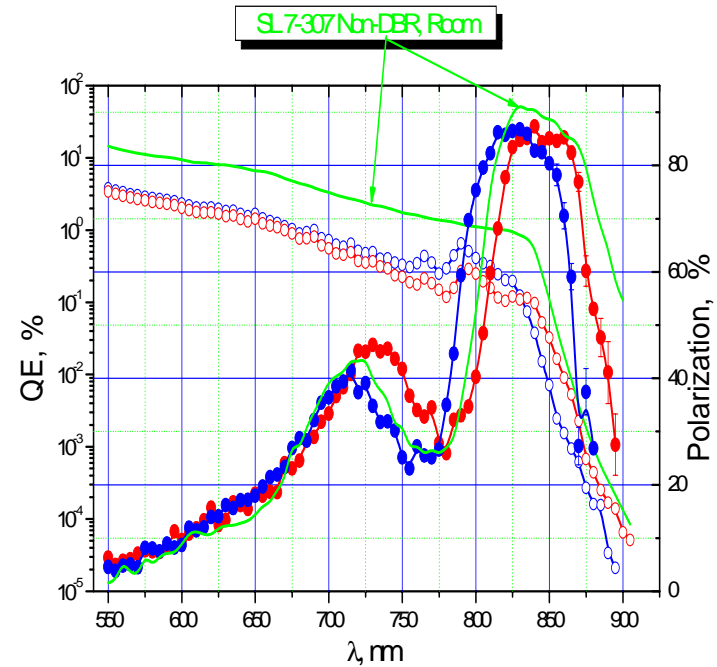
Two samples from St. Petersburg

SFbSPU data, November 28, 2006
 AlInGaAs/AlGaAs Superlattice 7-307, Room temperature

○ QE2, SL 7-308 T=130K Th=450C 16,01,2007 ● P2, SL 7-308 T=300K Th=450C 17,01,2007
○ QE2, SL 7-308 T=300K Th=450C 17,01,2007 ● P2, SL 7-308 T=130K Th=450C 16,01,2007



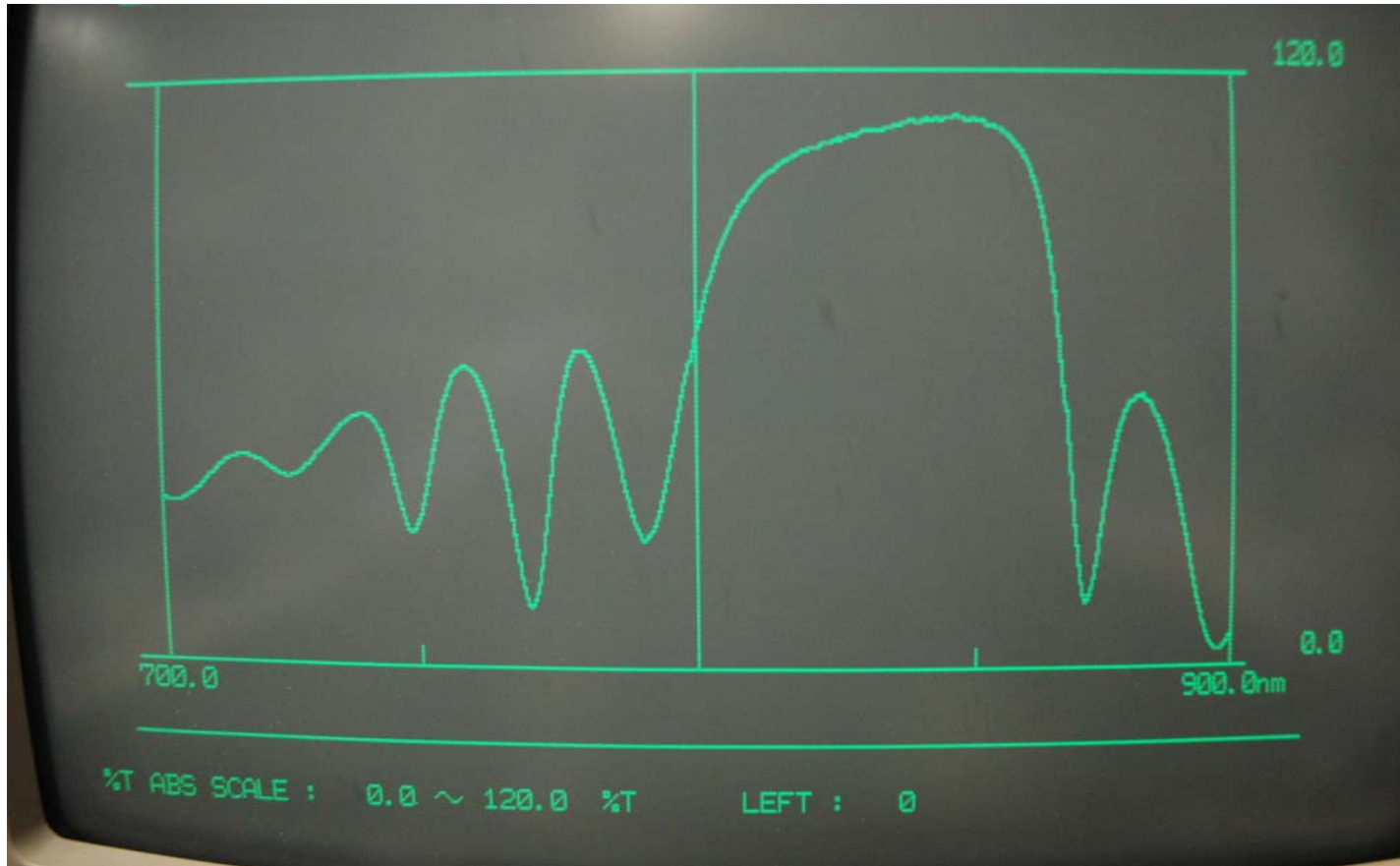
$P_{\max} \sim 91.5\% \text{ @ } 830 \text{ nm}$
 $QE \sim 0.85\%$



$P_{\max} \sim 85\%$
 $QE \sim 0.1\%$

As cap enabled heat-cleaning at 450° C.

Reflectivity of 7-308



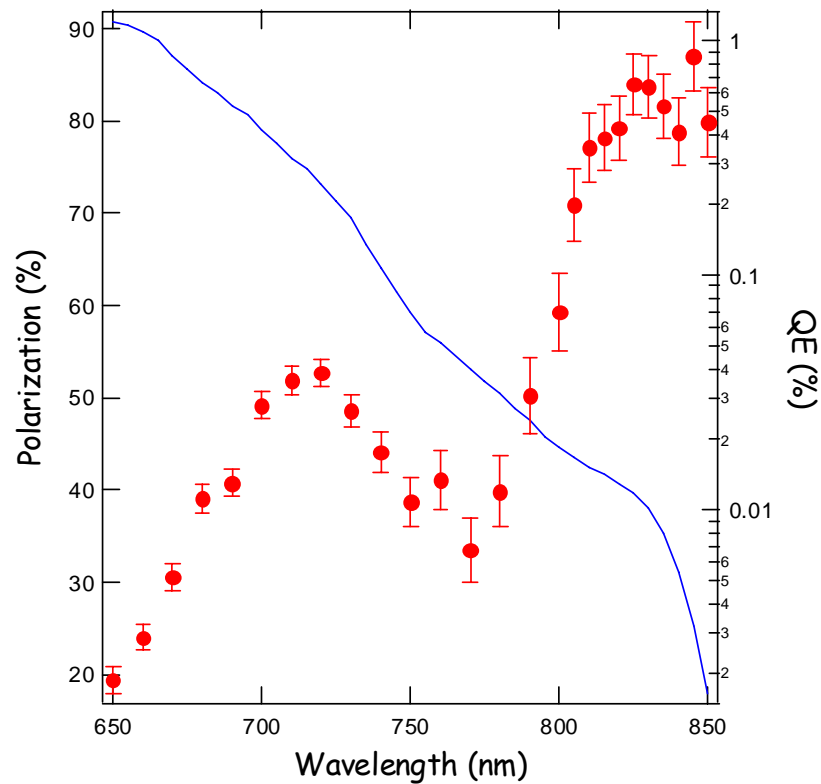
DBR looks OK.

CTS measurements

- 7-308
 - Sample #1
 - Assuming an As cap, no chemical cleaning was made.
 - After three heat-cleanings at 500° C, 520° C, and 540° C, QE was never high enough to measure QE/Polarization.
 - Sample #2
 - Standard TCE cleaning + NH₄OH stripping
 - 525° C heat-cleaning
- 7-307
 - Standard TCE cleaning + NH₄OH stripping
 - 525° C heat-cleaning

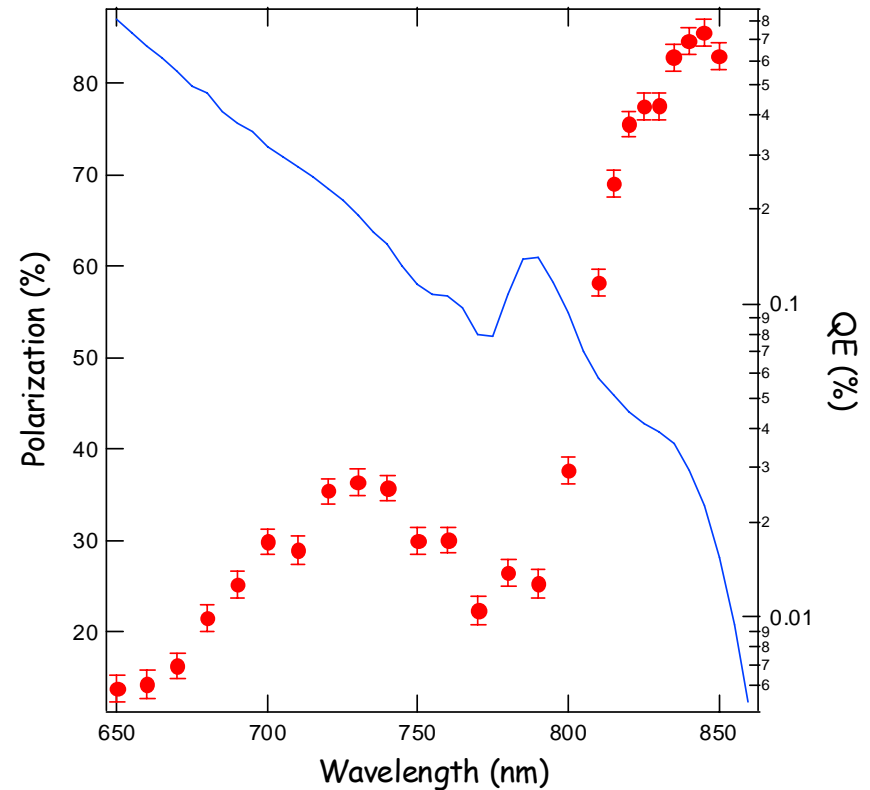
CTS measurements

7-307



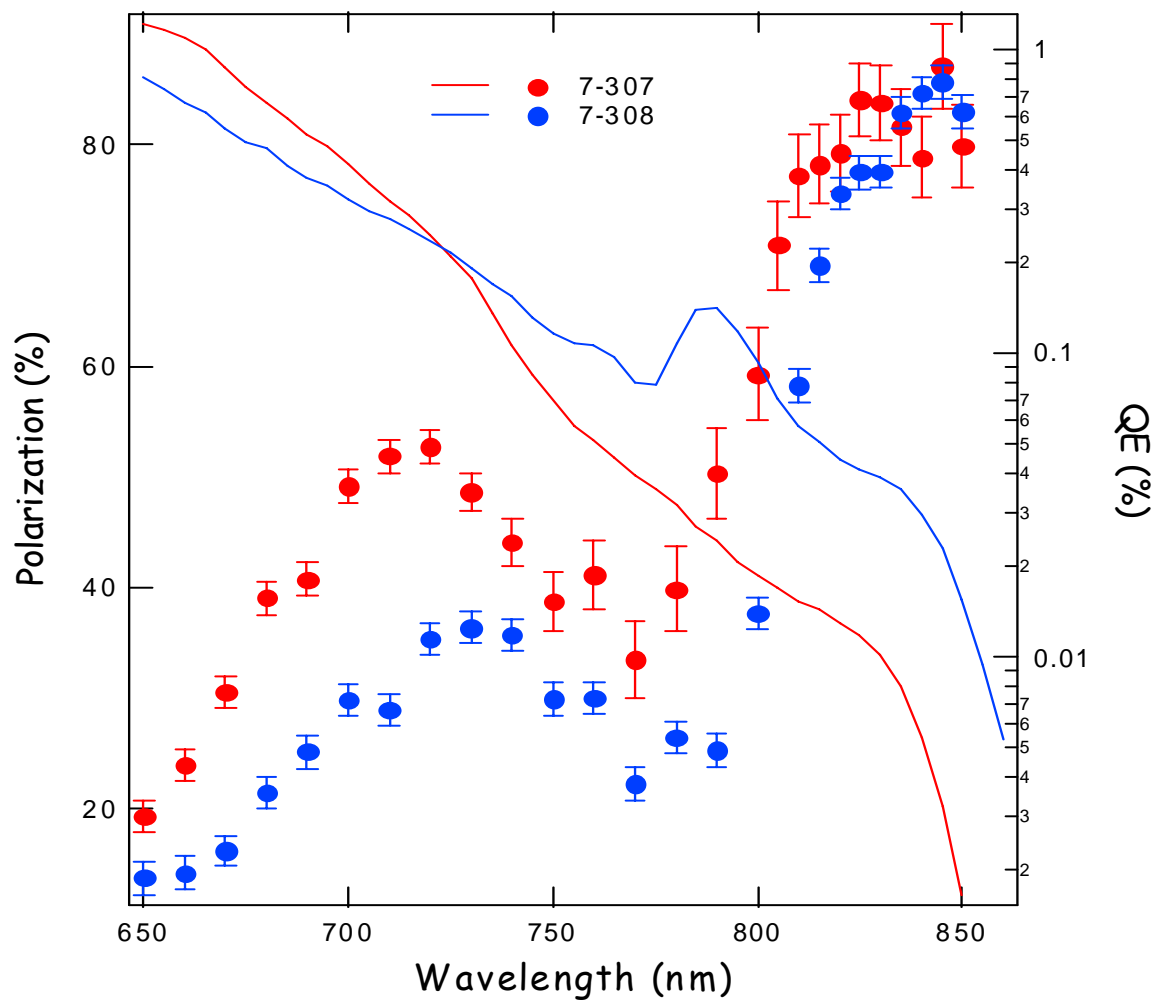
Peak polarization ~85%
QE ~0.015%

7-308



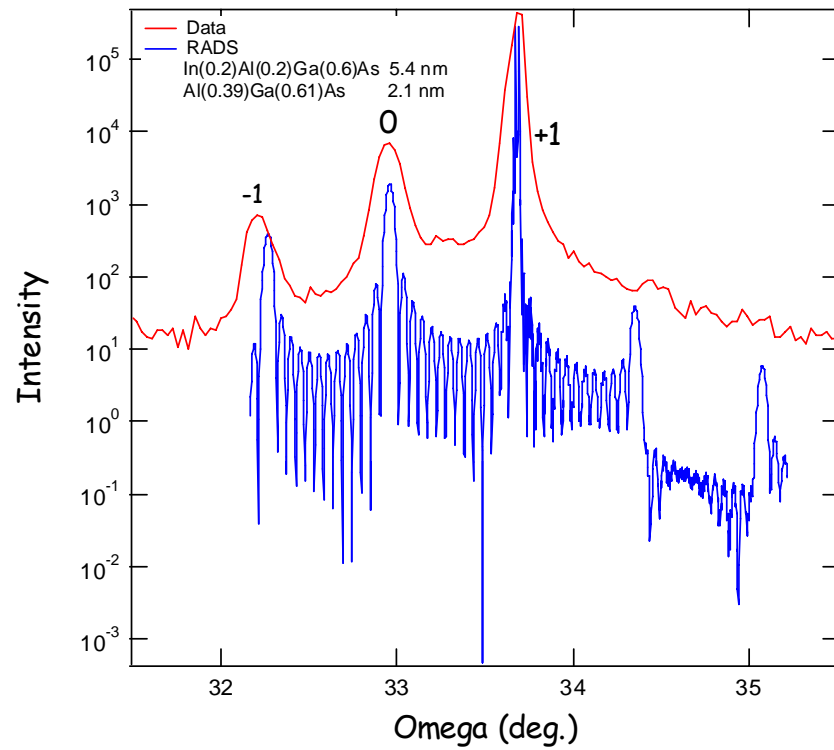
Peak polarization ~85%
QE ~0.025%

Comparison



X-ray

7-307



7-308

