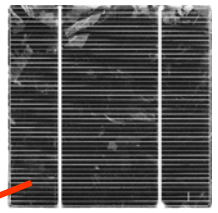
# Photovoltaic Conductor Grid Characterization



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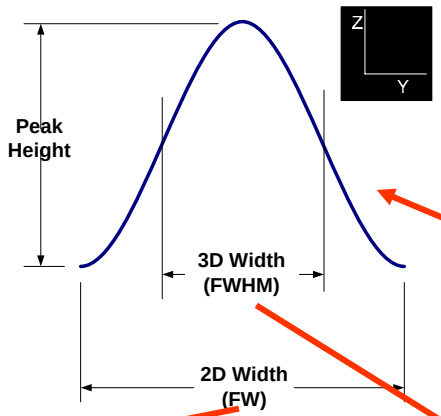
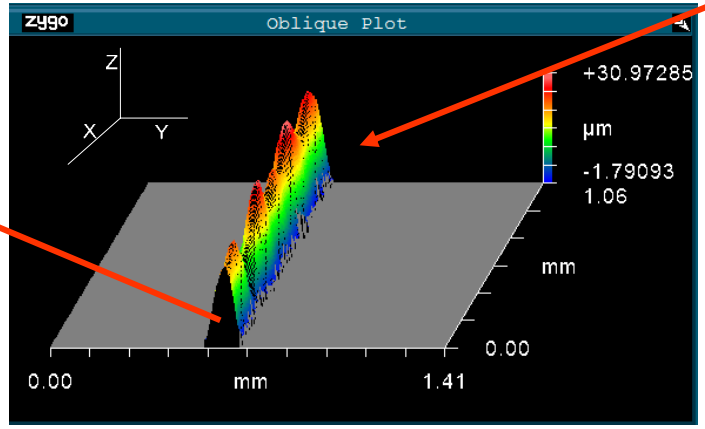
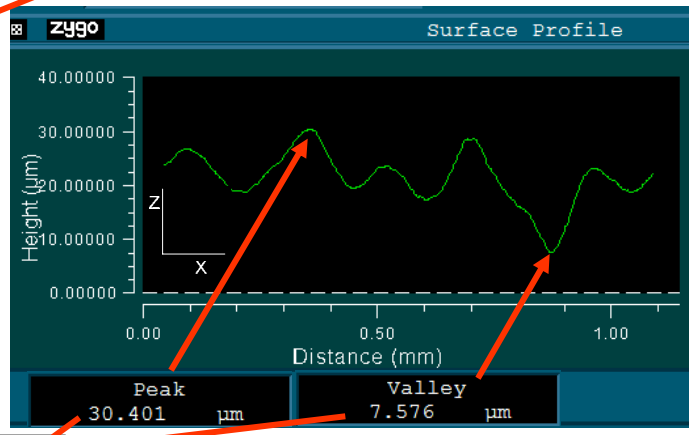
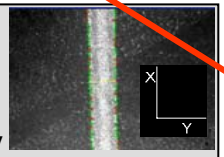



**2D line width** (FW) **affects photon efficiency**

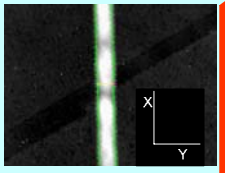



**Typical line width…**
Average FW = 165 ± 10 µm
Coverage of Ag = 1347 mm$^2$

**Reducing width & variation reduces coverage…**
Average FW = 155 ± 5 µm
Coverage of Ag = 1290 mm$^2$

**Reduced coverage ~ 4%**
**Increase efficiency ~ 0.4%**

**3D line area** (FWHM) **affects power efficiency**




**R ∝ CSA ≅ FWHM x Height**
where R=Resistance & CSA=Cross Sectional Area

**Typical CSA variation…**
CSA $_{Max}$ = 100 µm X 30.4 µm
CSA $_{Min}$ = 100 µm X 7.6 µm

**4X ΔCSA ⇨ 4X ΔR ⇨**
**4X power loss for that finger**

**Affects cell efficiency, cell matching & finger hot spots**

## Annual savings via 3D control of Ag

**Minimizing height variation reduces cost**