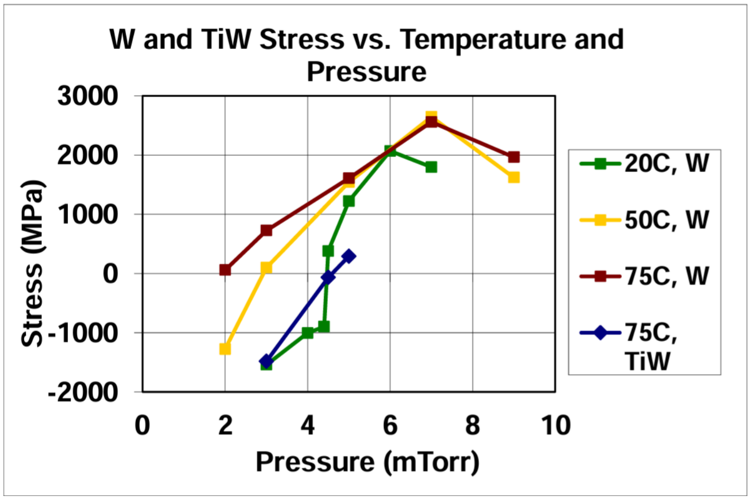
W Film by DC Sputtering using Sputter#3 (2024-2025)

Fatt Foong

Gun position: Gun1, DC5, SW4 (5/15/25)
Sputter Pressure: Ar flow 25 sccm at 4.5mTorr
Power: 300Watt on W target, no substrate bias and substrate temperature applied.
DCBias ~450-480 Volts.
Substrate parameters: Tilt 4mm preset; 1.52mm Height, rotation 10/min
Temperature: Room Temperature, 4” wafer mounted on thick holder (as heat sink)
Base Pressure: <1e-7 Torr

Stress vs Sputter Pressure

Older reference plot:



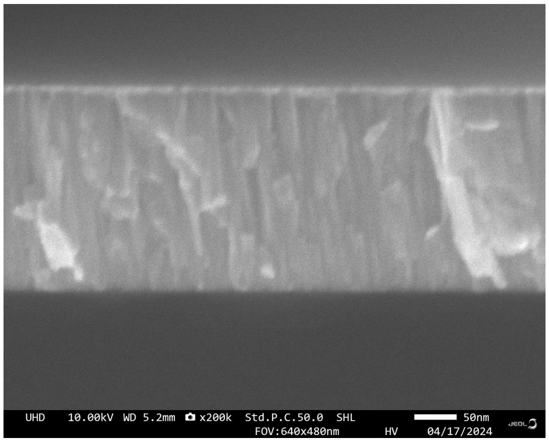
Confirmed the stress crossover is ~4.5mTorr at room temperature deposition.

Average stress is approximately -650 MPa to + 50 MPa depending on conditions of the system. Users should pre-test film stress if that is critical, by adjusting sputter pressure slightly.

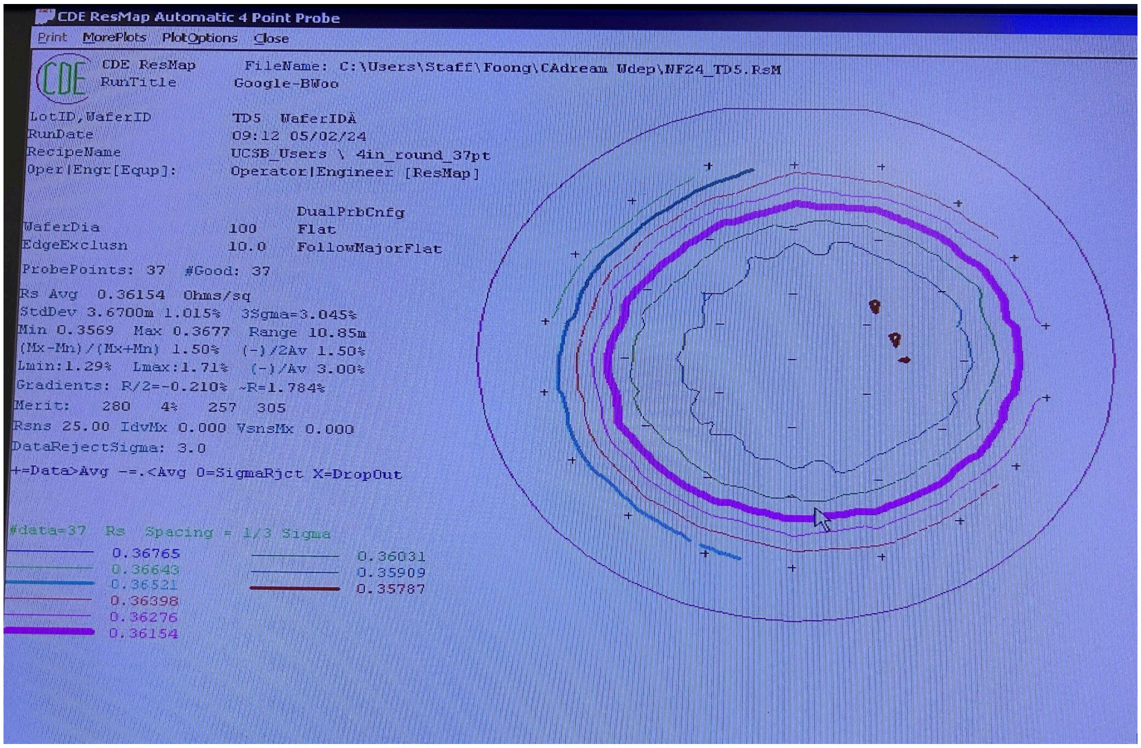
Film Properties:

Resistivity averages about 20 μOhms-cm.
Deposition Rate ~15-16 nm/min

SEM:



Uniformity 3 sigma ~3%, this is total uniformity.



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CDE ResMap        FileName: C:\Users\Staff\Foong\CAdream Udep\NF24_TD5.RsM
RunTitle         Google-BWoo

LotID,WaferID         TD5   WaferIDÀ
RunDate               09:12 05/02/24
RecipeName            UCSB_Users \ 4in_round_37pt
Oper|Engr[Equp]:      Operator|Engineer [ResMap]

                           DualPrbCnfg
WaferDia              100  Flat
EdgeExclusn          10.0  FollowMajorFlat
ProbePoints: 37  #Good: 37
Rs Avg   0.36154  Ohms/sq
StdDev 3.6700m 1.015%  3Sgma=3.045%
Min 0.3569  Max 0.3677  Range 10.85m
(Mx-Mn)/(Mx+Mn) 1.50%  (-)/2Av 1.50%
Lmin:1.29%  Lmax:1.71%  (-)/Av 3.00%
Gradients: R/2=-0.210% ~R=1.784%
Merit:    280   4%   257  305
Rsns 25.00 IdvMx 0.000 VsnsMx 0.000
DataRejectSigma: 3.0
+=Data>Avg -=.<Avg 0=SigmaRjct X=DropOut

#data=37  Rs  Spacing = 1/3 Sigma
          0.36765               0.36031
          0.36643               0.35909
          0.36521               0.35787
          0.36398
          0.36276
          0.36154
```