Solar Junction

Reliability Testing of Triple Junction Solar Cells with GaInNAs Bottom Layer Using Dilute Nitride

	Initial Flash Data					Final Flash Data				
Wafer name and piece	Voc (V)	Isc (A)	Fill Facto	Irradiance (W/cm^2)	Effic.	Voc (V)	Isc (A)	Fill Facto	Irradiance (W/cm^2)	Effic
C-485-4 P1	3.431	2.273	87.0%	53.4	40.7%	3.421	2.213	86.8%	52.2	40.3%
C-485-4 P7	3.439	2.271	86.8%	53.3	40.7%	3.419	2.220	86.5%	52.3	40.2%
C-486-4 P2	3.434	2.289	86.3%	53.4	40.7%	3.419	2.236	86.2%	52.2	40.4%
C-486-4 P6	3.431	2.271	86.5%	52.9	40.8%	3.429	2.239	85.7%	52.3	40.3%
C-493-4 P3	3.431	2.292	85.8%	53.3	40.6%	3.436	2.256	85.6%	52.3	40.7%
C-493-4 P5	3.429	2.294	86.0%	53.3	40.7%	3.419	2.258	85.5%	52.5	40.3%
	Reference Cells									
C-485-4 P4	3.43	2.297	85.6%	53.768768	0.402	3.432	2.240	85.4%	52.7	39.9%
C-486-4 P4	3.425	2.284	86.1%	53.67863	0.402	3.419	2.243	86.7%	52.8	40.3%
C-493-4 P4	3.427	2.304	85.8%	53.511983	0.405	3.420	2.267	85.9%	52.7	40.5%

- Under Sun Tests
- Six Piece Sample Stressed
- Three Piece Sample Unstressed

HALT

Matrix of Sun-Years of Cell Life for Different Activation Energies and Operating Temperatures based on No Failures of 22 cells after 166 hours at

Operating Temp (°C)	Activation Energy (eV) 0.7	0.8	0.9	1.0
80	179	369	763	1576
90	95	179	338	637
100	52	90	156	271
110	30	47	75	120

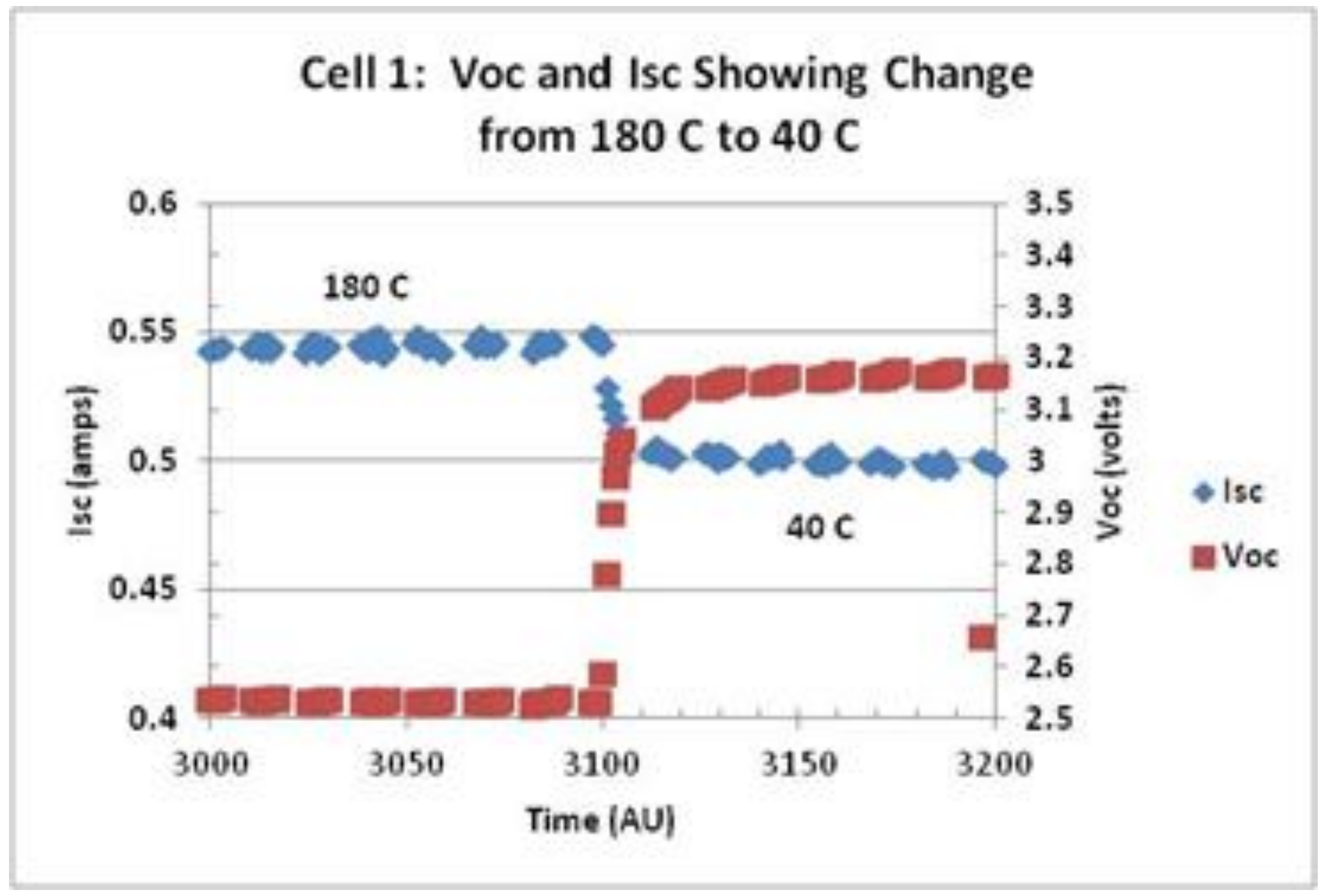
1 sun-year = 9 sun-hrs/day*365 days/yr = 3285 hrs

- Probability of Failure After 30 Years ≤ 1%

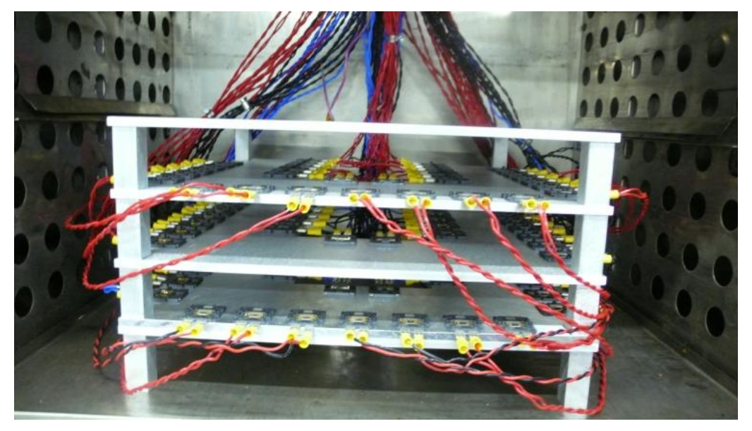
Under Sun Chamber
100 – 1000 Suns

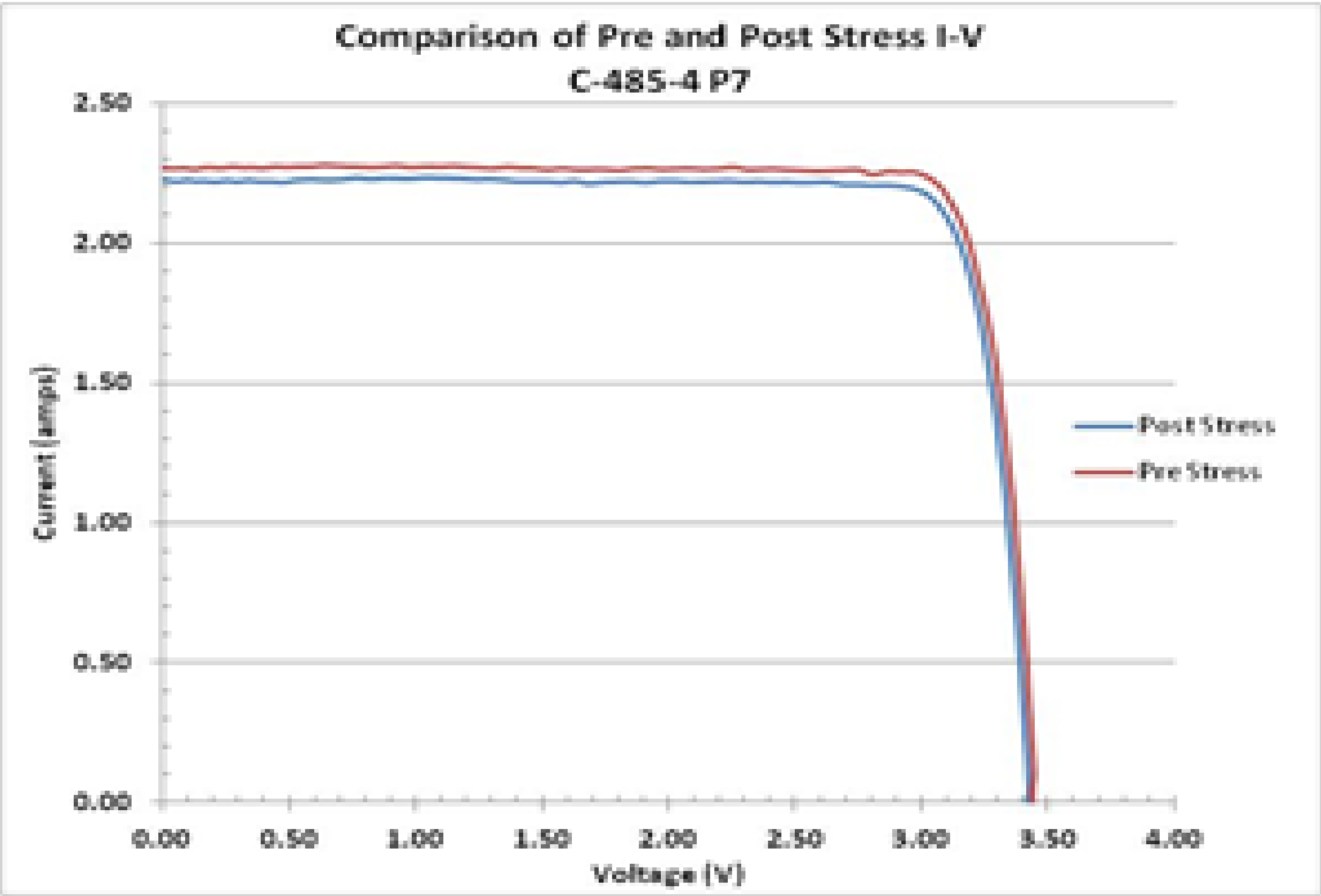
	Delta after 6931 total cycles.			
Cell ID	ΔVoc	ΔIsc	ΔFF	ΔEff
C-485-4 P1	-0.29%	-2.68%	-0.21%	-0.96%
C-485-4 P7	-0.58%	-2.24%	-0.40%	-1.18%
C-486-4 P2	-0.43%	-2.34%	-0.05%	-0.56%
C-486-4 P6	-0.06%	-1.39%	-0.94%	-1.18%
C-493-4 P3	0.12%	-1.57%	-0.19%	0.25%
C-493-4 P5	-0.29%	-1.55%	-0.61%	-0.95%
Ave.	-0.26%	-1.96%	-0.40%	-0.77%
References				
C-485-4 P4	0.04%	-2.48%	-0.15%	-2.03%
C-486-4 P4	-0.18%	-1.78%	0.67%	-1.63%
C-493-4 P4	-0.18%	-1.57%	0.15%	-1.43%
Ave.	-0.11%	-1.94%	0.22%	-1.70%

- Under Sun Testing 30 Sec on 30 Sec off
- Six Piece Sample Stressed
- Three Piece Sample Unstressed



- High Temp Storage
- 22 Piece Sample





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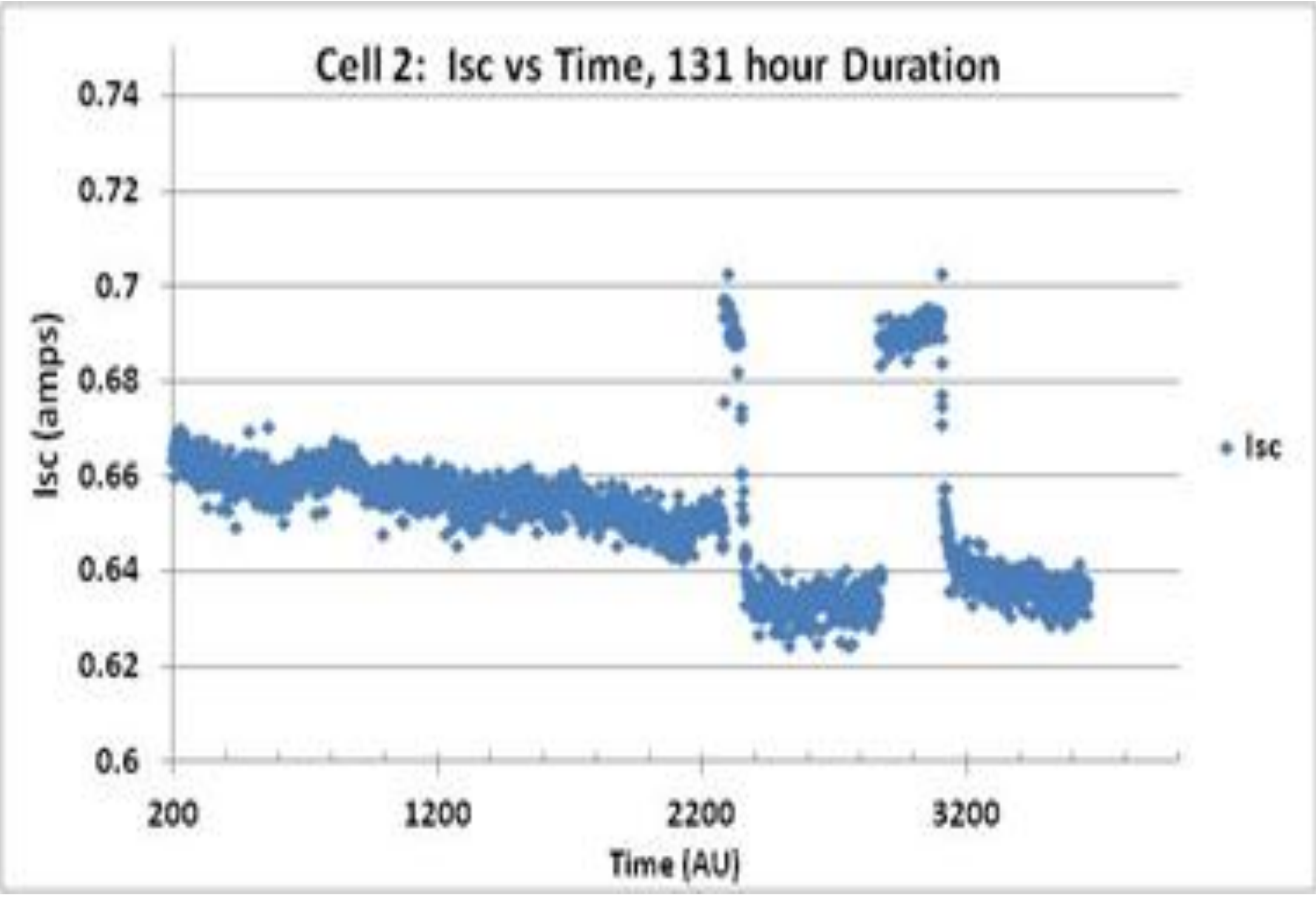

- High Temp Storage
- 22 Piece Sample

Data Supplied by Dr. John Herb

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