

GPi



ADVANCED SILICON NITRIDE COATING TECHNOLOGY

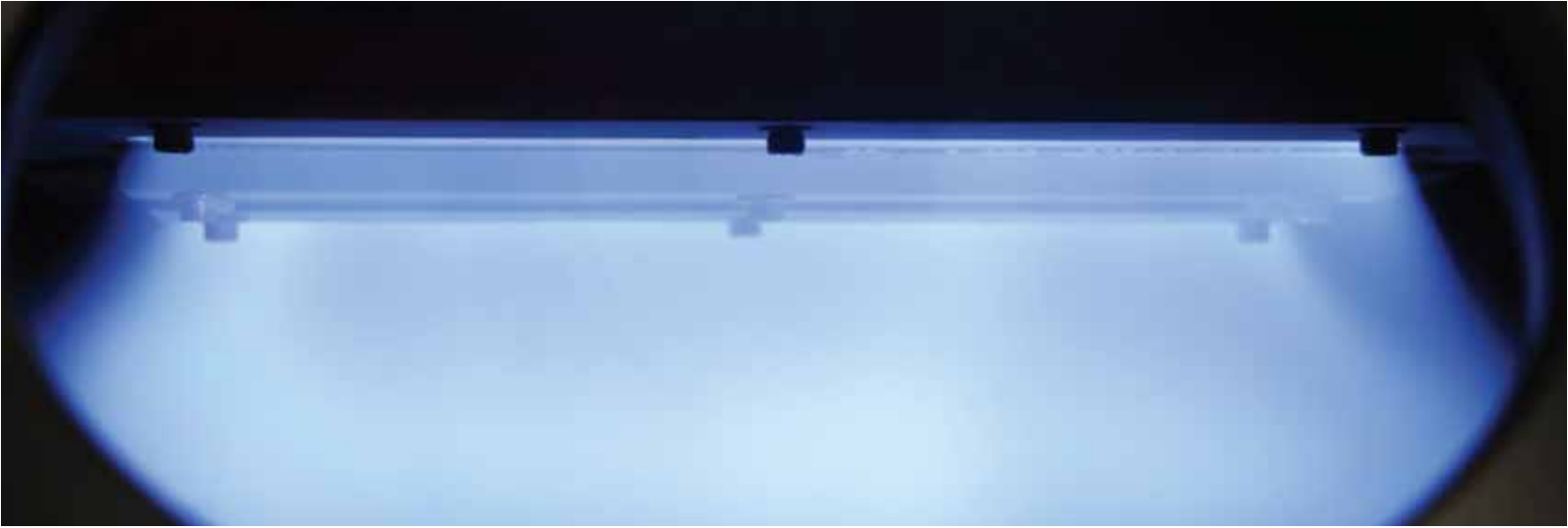
**New Plasma Source
Delivers Breakthrough
in Plasma CVD
Technology**

- 2ms Carrier Lifetime
- +/-3% Uniformity Over 1+ Meter
- Refractive Index Control 1.85-2.25
- High Deposition Rate (>60nm.m/min per Source)
- Long Production Runs – No Exposed Electrodes
- Efficient Silane Use (>15%)



www.GeneralPlasma.com

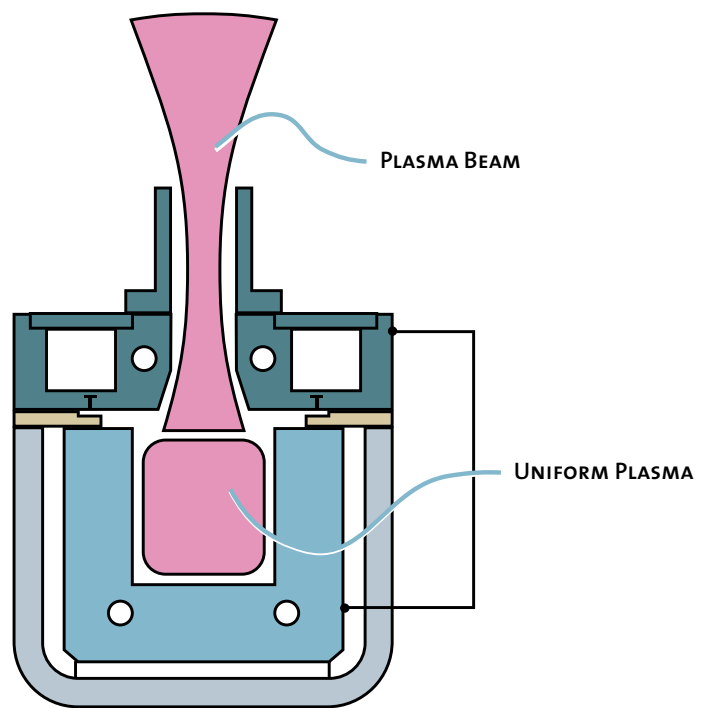
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GPI's Plasma Beam Source™

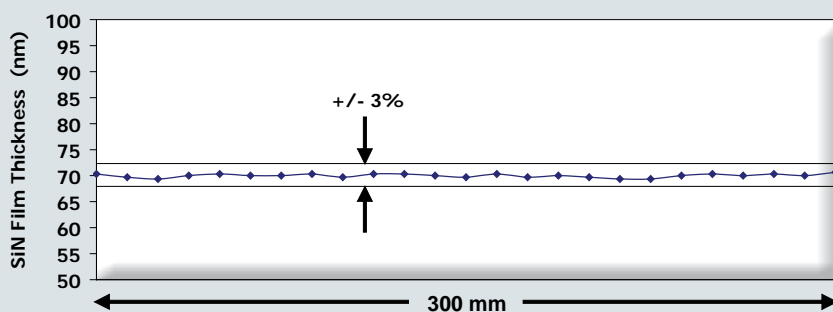
Patented, additional patents pending

- **SPUTTER MAGNETRON-LIKE UNIFORMITY**
Extendable to 3+ meters
- **INTERNAL "HIDDEN" ELECTRODE**
No electrode coating
Long production runs
Minimal maintenance
- **UNIQUE HIGH ION FLUX/LOW ION ENERGY SOURCE**
>2ms carrier lifetime at 300°C
>1.5ms carrier lifetime at 200°C
- **HIGH DENSITY PLASMA**
High rate, 60nm.m/min deposition
>15% SiH₄ efficiency



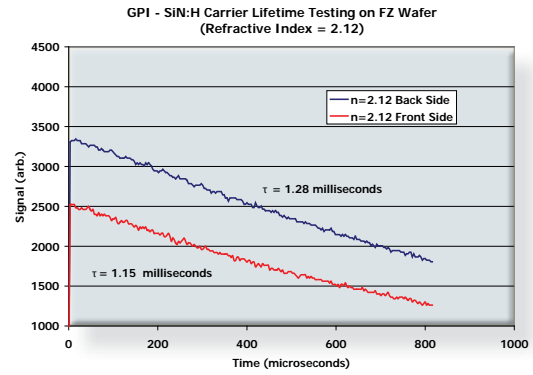
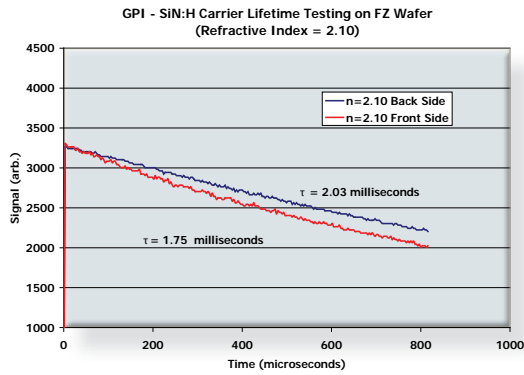
Uniformity

The inherent scalability of the PBS™ (Plasma Beam Source) enables uniformity to be comparable to magnetron sputtering, far exceeding other PECVD technologies. The uniformity across a 300mm substrate is shown here.

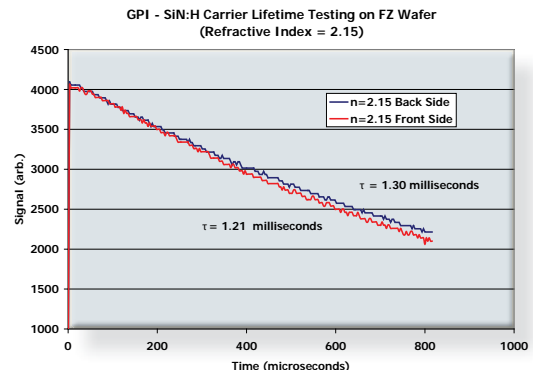


General Plasma Inc.™

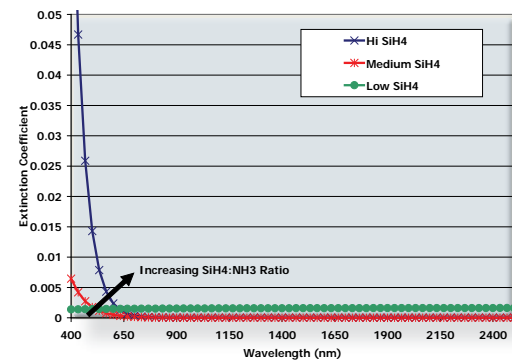
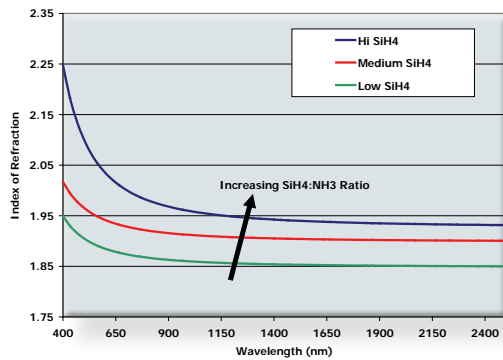
Carrier Lifetime



Carrier lifetime measurements¹ were made on SiN coated wafers with different refractive indices. GPI carrier lifetimes far exceed industry benchmarks.



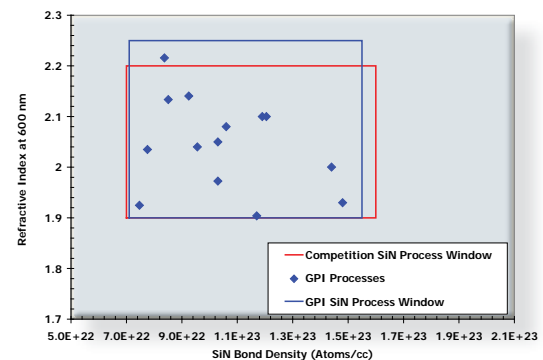
Optical Performance



WIDE PROCESS WINDOW

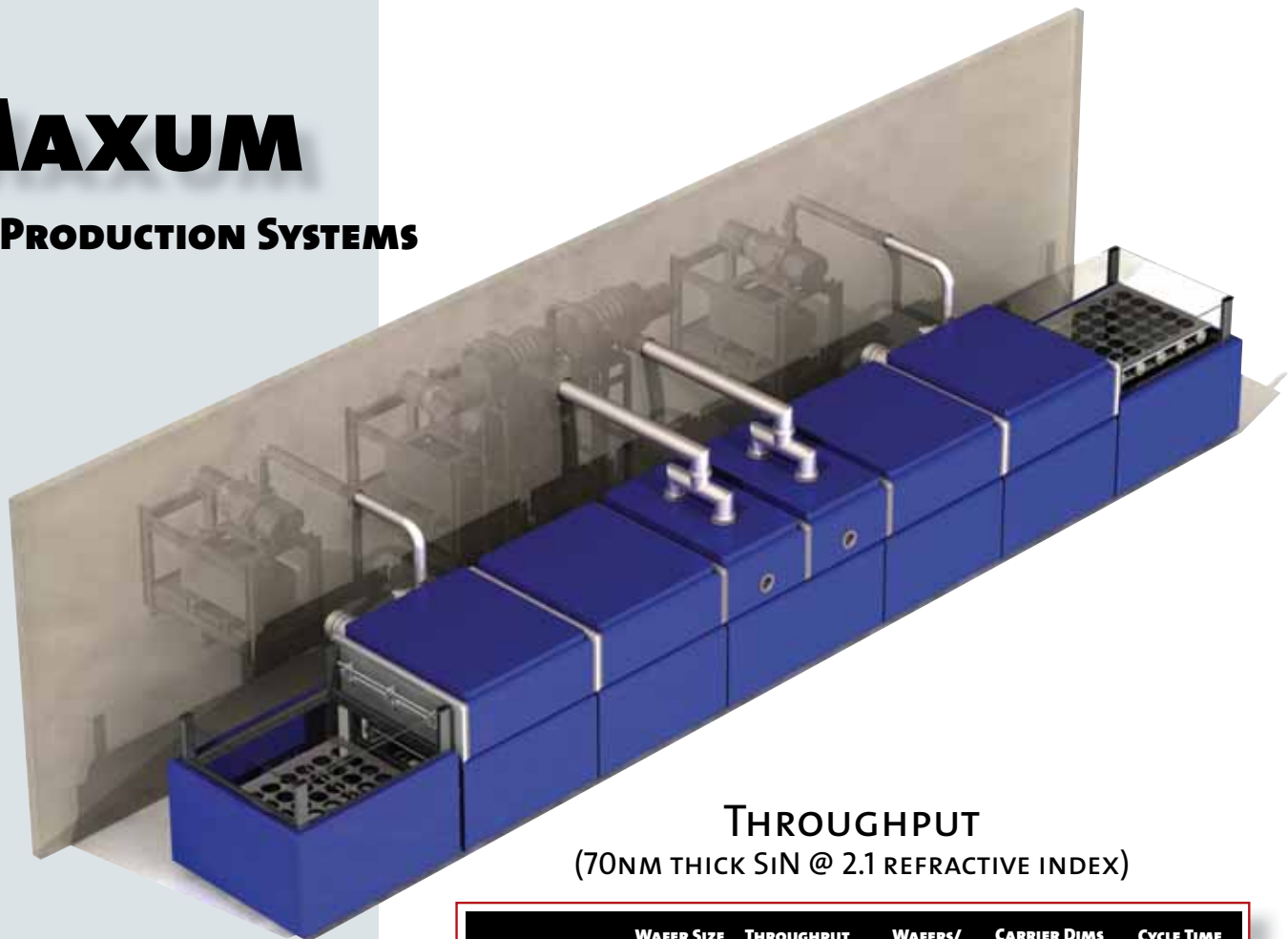
- REFRACTIVE INDEX: 1.85-2.25
- SiN BOND DENSITY: 7.0×10^{22} - 1.9×10^{23} ATOMS/CC
- CARRIER LIFETIMES EXCEEDING 2MS DEMONSTRATED

¹Measurements were certified by Dr. R. Ahrenkiel, Research Professor at Colorado School of Mines and Research Fellow at the National Renewable Energy Laboratory (NREL).



MAXUM

SiN PRODUCTION SYSTEMS



THROUGHPUT (70NM THICK SiN @ 2.1 REFRACTIVE INDEX)

	WAFER SIZE (MM)	THROUGHPUT (WAFERS/HOUR)	WAFERS/ CARRIER	CARRIER DIMS (MM)	CYCLE TIME (s)
MAXUM 600L	125	720	18	600 x 1000	90
	156	600	15		
	210	320	8		
MAXUM 600H	125	1080	18	600 x 1000	60
	156	900	15		
	210	480	8		
MAXUM 1000L	125	2160	54	1000 x 1300	90
	156	1400	35		
	210	800	20		
MAXUM 1000H	125	3240	54	1000 x 1300	60
	156	2100	35		
	210	1200	20		

**PRODUCTION COATERS FOR
SiN IMPLEMENTING GPI'S
REVOLUTIONARY PBS™
TECHNOLOGY. SYSTEM SIZES
FROM PILOT TO FULLY AUTO-
MATED HIGH THROUGHPUT
PRODUCTION.**

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General Plasma is a premier supplier of advanced PECVD solutions, custom thin film systems and advanced source technologies. General Plasma's Plasma Beam Source™ is a revolutionary new thin film technology that will enable a host of applications – including PV.