

Solar Wet Process Expertise

High Volume Process Performance

NAURA Akrion has a full line of wet processing solutions to support your solar cell wet processing needs. The systems incorporate the technology and platforms that we have developed in 20 years of engineering over 1400 wet processing systems.

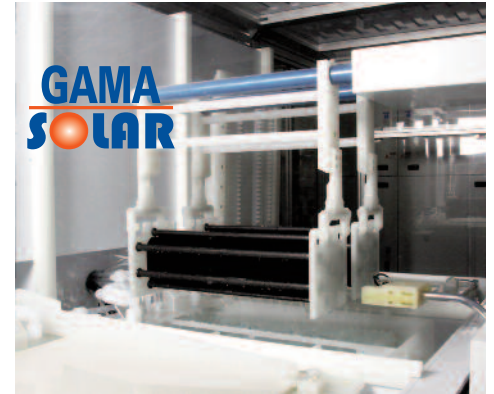
With GAMA-Solar, we are leveraging the expertise developed from IC device processing in the more than 300 GAMA Systems installed in leading edge fabs worldwide. We have taken this robust base and adapted it to the requirements of the photovoltaic market.

Purchasing a GAMA-Solar also gives you access to the most experienced wet process engineers in the business. Whether it's solving a process problem or optimizing your recipe, you can depend on us to provide you with the support you want.



GAMA-SOLAR PRODUCT FEATURES

- Throughput up to 3000 wafers per hour - dependent on tool configuration and process recipe
- Reliability > 1000 hours MTBF (per SEMI E10-96)
- CE and UL Certified
- All Standard Wafer Sizes
- Wafer thickness 160-300 microns
- 200 wafer lots (in two 100-wafer carriers) compatible with most industry standard process carriers



AKRION SYSTEMS DIFFERENCE:

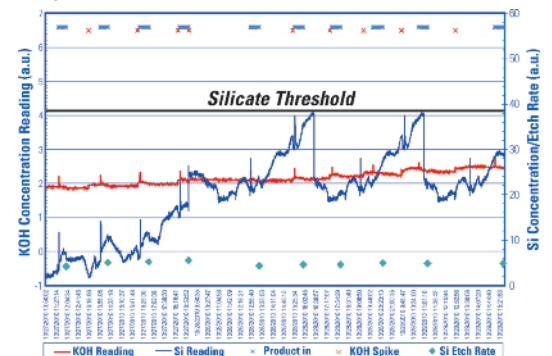
- Extended bath life
- On-site process support
- State-of-the-art Applications Laboratory
- Worldwide process support
- 24 x 7 technical support
- Experienced management team
- ISO 9001:2000 compliant

- Capability to run acidic and alkaline texturization in one tool
- Recirculated and temperature controlled process baths with re-circulation loops of < 120 liters
- Integrated UPS system to protect product in case of power interruption
- Integrated chemical blending, dosing
- Bleed and feed capabilities for extending bath life

CLOSED LOOP PROCESS CONTROL OPTIMIZES COO:

- Temperature
- Recirculation rate
- Chemical concentration
- Rinse bath composition

- Develop new applications or fine tune your process in our state-of-the-art applications lab with our fully functional GAMA system
- Ability to monitor and control all key process parameters
- Complete MES/SECS GEM interface supplied with every tool includes: wafer lot tracking for all critical process parameters
- Includes startup and qualification by our expert process engineers



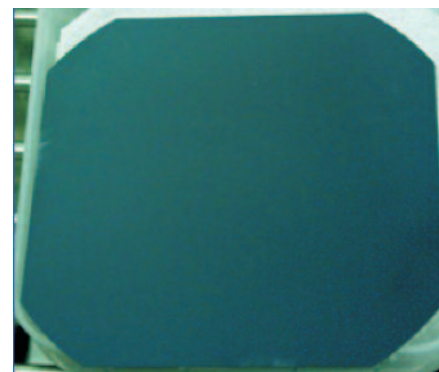
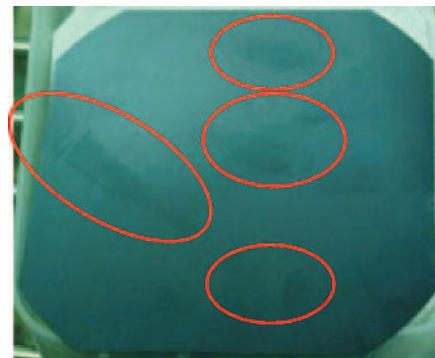
ICE-1™ technology controls chemical concentration and extends bath life

SAMPLE GAMA-SOLAR APPLICATIONS

MONOCRYSTALLINE TEXTURIZATION, SAW DAMAGE REMOVAL & CLEAN

Monocrystalline Texturization, Saw Damage Removal & Clean

PROCESS	PURPOSE
Pre-clean <i>(recommended)</i>	Use an alkaline pre-treatment solution to remove organic contamination and particles from the wafer surface to improve texturization uniformity.
Heated KOH/IPA <i>multiple tanks required for throughput</i>	Alkaline solution eliminates damage (small cracks) from sawing process that if not eliminated would reduce the amount of energy that is outputted from the cell.
HF/HCl	Final clean step removes metal impurities and oxide to maximize minority carrier lifetime and sheet resistance to yield higher cell efficiency.



Pre-treatment conditions the wafer surface for good uniform texturization across the wafer (bottom)

SPOTTY AREAS (top) result from remaining contamination such as handling marks and finger prints

MULTICRYSTALLINE ISOTEXTURE, SAW DAMAGE REMOVAL & CLEAN

PROCESS	PURPOSE
Pre-clean <i>(recommended)</i>	Use an alkaline pre-treatment solution to remove organic contamination and particles from the wafer surface to improve texturization uniformity.
HF/HNO ₃	Acidic solution eliminates damage (small cracks) from sawing process that if not eliminated would reduce the amount of energy that is outputted from the cell. Create small bumps on the wafer to reduce the amount of light that is reflected off of the wafer surface.
KOH	Alkaline solution removes the porous silicon generated from the above acidic texturization step.
HF/HCl	Final clean step removes metal impurities and oxide to maximize minority carrier lifetime and sheet resistance to yield higher cell efficiency.

PSG ETCH & ADVANCED CLEAN

PROCESS	PURPOSE
HF	Acidic solution removes the deposited phosphosilicate glass (PSG) to prepare the wafer for AR nitride deposition.
Alkaline Clean <i>(recommended)</i>	Use an alkaline solution to remove contaminates from the wafer surface that were added during previous steps. These contaminants, if not removed, can affect the passivation of the surface and the resultant quality of the aluminum paste that can be applied.
HF <i>(recommended)</i>	Acidic solution removes the oxide grown on the wafers during the clean up step. Prepares a clean surface before AR deposition.

NAURA AKRION - YOUR PV WET PROCESS PARTNER

- In-house process group for implementation and continuous optimization
- PhD scientists with years of wet process experience
- Lab system capable of running any size solar wafer; all chemistries are available



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