Plasma CVD System

VDS-5800 Series

for Compound Semiconductor Mass Production

JAPAN PRODUCTION ENGINEERING LABORATORIES Co.,Ltd.

July-2013

Company Profile

Company Name	**JAPAN PRODUCTION AND ENGINEERING LABORATORIES Co.,Ltd.**
President	**Yasuaki Gomi**
Headquarters	**2453-20 Iiyama,Atsugi-sity,Kanagawa**
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E-Mail	**info@jpel.co.jp**
Establishment	**July-15,1969**
Business	**Manufacturing,Sales and A/S of Semiconductor Process System** **Manufacturing,Sales and A/S of Solar-Cell Production System** **Manufacturing,Sales and A/S of LED-Chip Production System**
Capital	**80,000,000円**

【Headquarter-A】

【Headquarter-B】

JPEL 's History

1969	JAPAN PRODUCTION ENGNEERING LABORATORIES Co.,Ltd. was established
1980	Released PE-CVD system [VDS-2010]
1981	Released mass production type PE-CVD system [VDS-5000] *Domestic first*
1982	Released in-line type PE-CVD system [VDS-6000]
1984	Released in-line hi throughput type PE-CVD system [VDS-7000]
1994	Released multi-chamber type PE-CVD system [VDS-5800DU]
2000	Released single-chamber type PE-CVD system [VDS-5800SN]
2004	Released compact type PE-CVD system [VDS-5800SNC]
2007	Released mass production type PE-CVD system for 300mm Wafer [VDS-5900]
2008	Released PE-CVD system for solar cell ARC [SJP-1200]
2010	Released Additional model of [VDS-5800] Series
2012	Released mass production type PE-CVD system for solar cell ARC [SJP-3000] Released PE-CVD system for LED and power device R&D [VDS-5700]

JPEL's Strength

1. Wealth of past record and experience for compound semiconductor

JPEL has plenty of sales record and experience in compound semiconductor field, including its installation result in the 1st volume production line for 6 inch GaAs wafer in Japan.

JPEL provides user-friendly equipment based on the accumulated experience, know-how about handling of various kinds of wafers and process know-how of deposition film on such wafers.

2. Customization

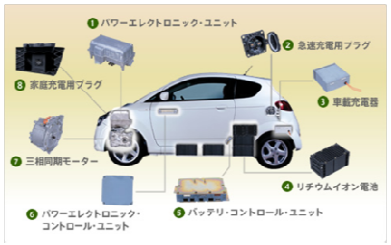
JPEL offers a customized equipment based on each customer's requirement.

For example, JPEL provide a function to switch wafer size, and/or, a function to adjust lift pin position based on the customer's device structure, by simply selecting on the touch panel screen.

Target Application

High Brightness LED

- Automotive HeadLight
- LED Lighting
- LCD BackLight



Car Electronics

- Power Electronics Unit
- Sensors

Smart Phon

- Saw Device
- Sensors

		Reliability	Weatherability	B/V	Leak current	Downsizing	Long lifetime
High Brightness LED	Automotive HeadLight	◎	◎	○	○	○	◎
	LED Lighting	◎	○	○	○	○	◎
	LCD BackLight	◎	○	○	○	○	○
Car Electronics	Power Electronics Unit	◎	◎	◎	○	○	◎
	Sensors	◎	◎	◎	○	○	◎
Smart Phon	Saw Device	◎	○	◎	◎	◎	○
	Sensors	◎	○	◎	◎	◎	○

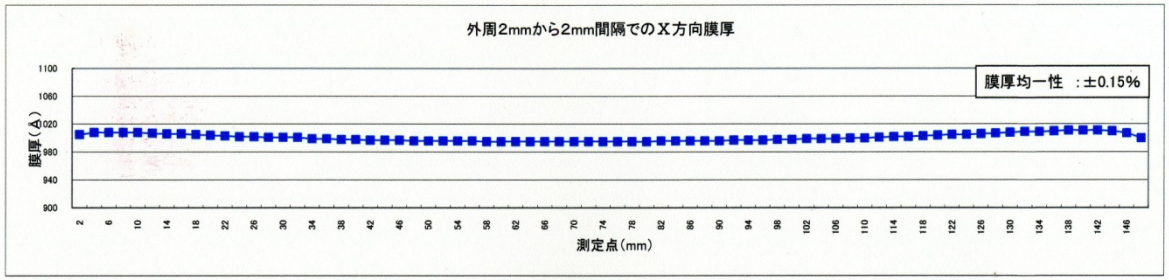
※Breakdown Voltege

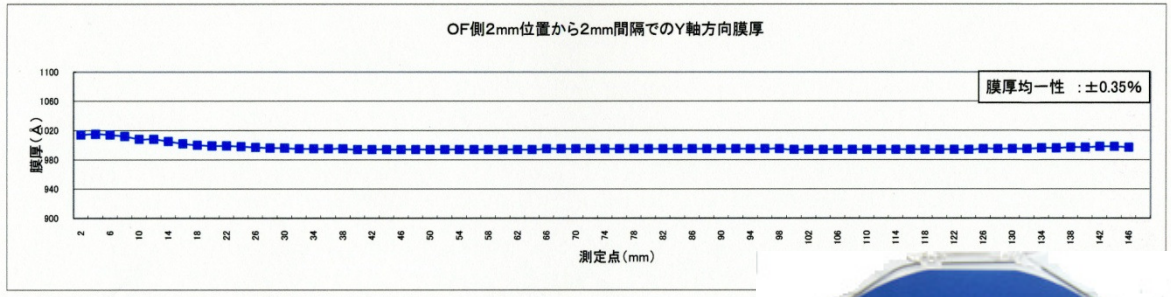
We need high quality film !

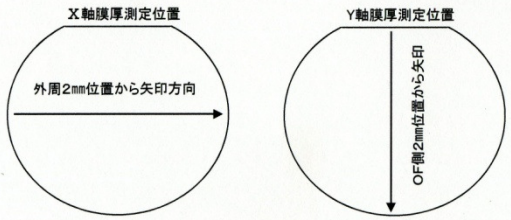
Characteristic of VDS Series

Superior film thickness and film quality uniformity

Gas-Cleaning after every Batch processing contributes to high quality and film thickness uniformity improvement.







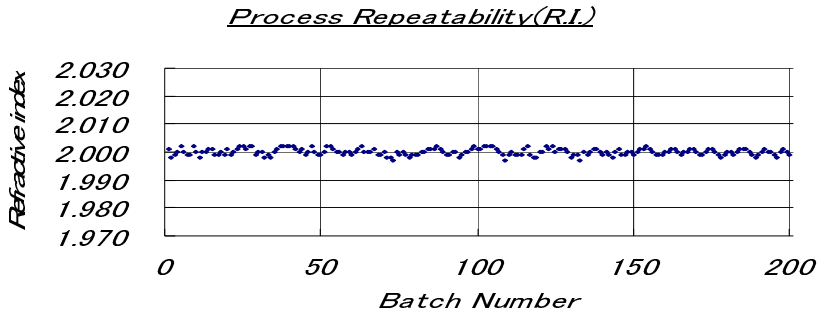
Characteristic of VDS Series

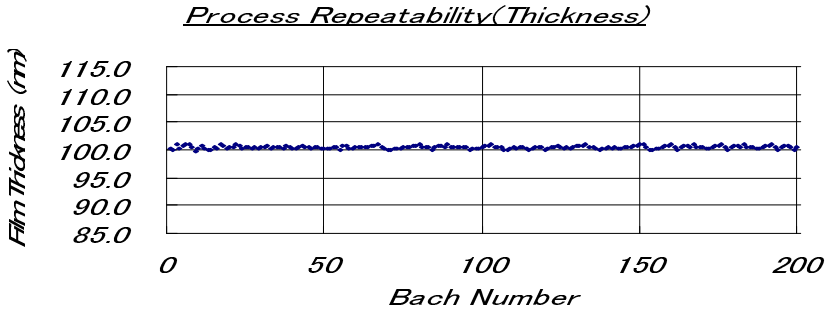
Superior film thickness and film quality repeatability

The right figure is a graphic of the repeatability of 200batches.

(Deposition→Cleaning→Deposition)

refractive index and film thickness is very good repeatedly.

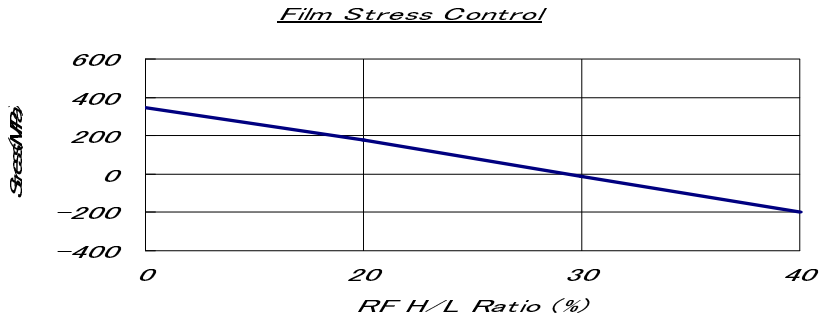




Stress Control

The right figure is a graphic of the changes of stress.

Stress is controlable by RF-frequency control.

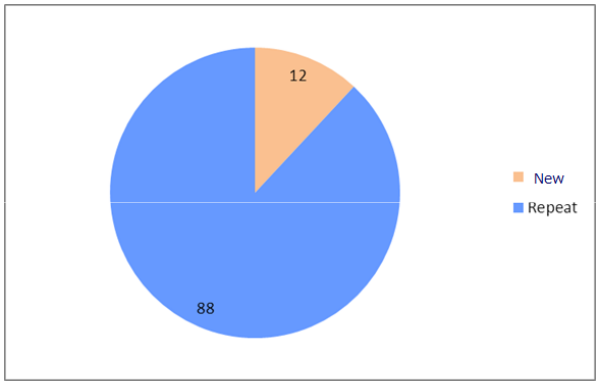


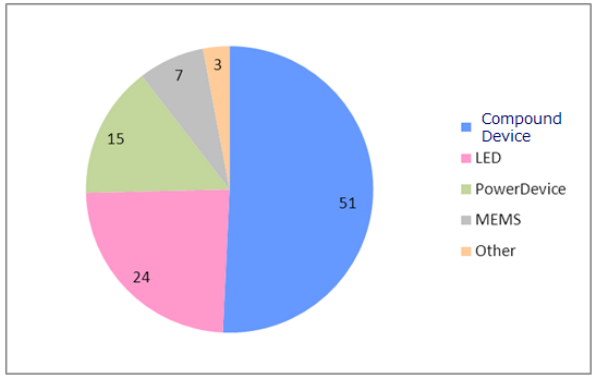
Installation record (VDS-5800 Series)

JPEL has shipped 67 units of VDS-5800 series. (In total, 511 units for all models.)

From the installation result, it is obvious that there are many repeat customers.

VDS-5800Series installation result





Most of the customers are repeat customers from previous model, VDS-5600Series.

Three-fourths of the application are devices for wafers other than silicon.

Major users of VDS-5800Series:

Panasonic／RenesasElectronics／Rohm

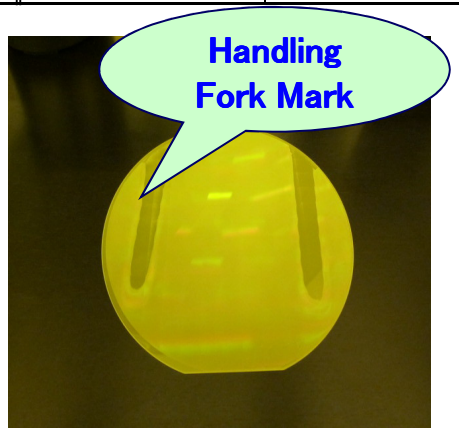
Denso／HamamatsuPhotonics／Kodenshi

Asahikasei Microdevides, etc.

Comparison with Novellus Concept－1

		JPEL（VDS-5800）	N-Co.	Comparison
Structure	Electrodes	1Head／8枚	5Head／各1枚	Continuous deposition (JPEL) vs. Multi-layer deposition(N-Co.)
	High Fequency Power Source	Wafer side is earth.	No earth	Charge up: JPEL ＜ NOVELLOS
Deposition conditions	Hi Power [W]	200	480	JPEL ＜ N (2.4X)
	Lo Power [W]	20	320	JPEL ＜ N (16X)
	SiH4 flow rate [cc]	20	200	JPEL ＜ N (10X)
	NH3 flow rate [cc]	50	1,800	JPEL ＜ N (36X)
	Pressure [Pa]	150	373	JPEL ＜ N (2.48X)
Evaluation Results	Refractive Index	1.861	1.855	JPEL ≒ N
	Film Stress [MPa]	-86.5	102.0	0 に対してJPEL ＜ N
	Film Thickness Uniformity within a Wafer[%]	2.08	2.30	JPEL ＜ N (0.22)
	Deposition Rate[Å/sec]	4.9	24.3	JPEL ＜ N (4.96X)
	LAL300 EtchingRate[Å/min]	802	3,603	JPEL ＜ N (4.5X)
	High-freq. Power Source Power Density[1cm²/w]	0.001	0.025	JPEL ＜ N (25X)

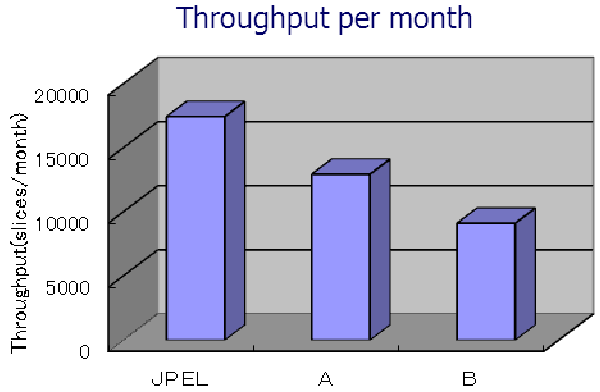
Deposition result by JPEL

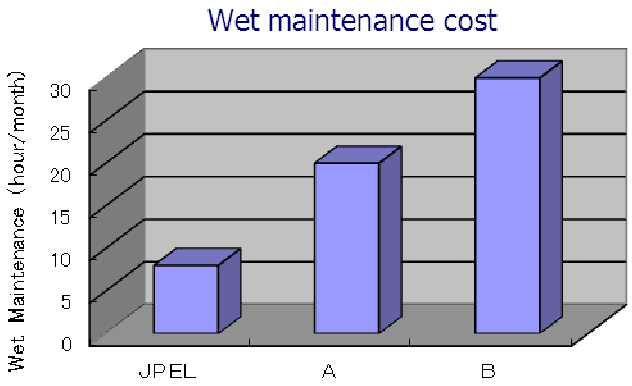


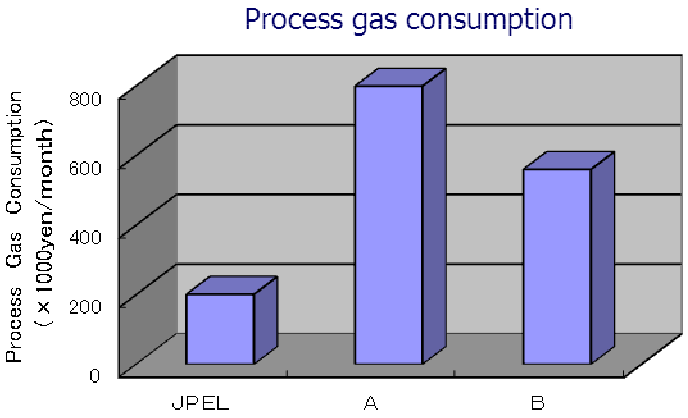
Deposition result by N-Co.

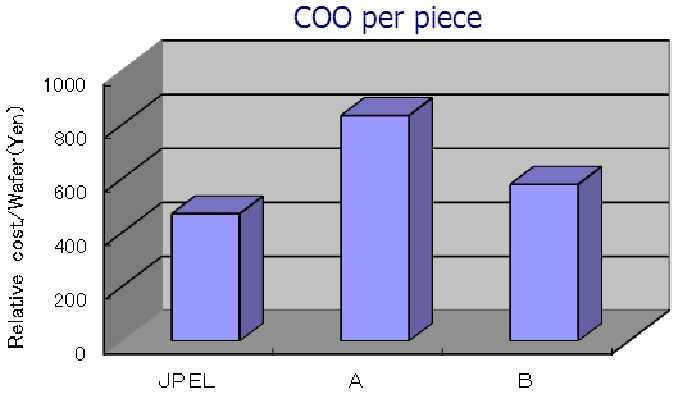
These are process evaluation results both for JPEL and N-Co., aiming same level of Refractive Index and Uniformity. Lower deposition rate of JPEL results in the lower etching rate, as well.
The formed SiNx film by JPEL is much dense and higher quality film than N-Co.

Comparison with competitive PECVD's









B in the above figures is Novellus Cponcept-1. The COO is calculated in consideration of all items including machine footprint, uptime and etc.

(A is AMAT P-5000.)

The challenge to Costdown

New Lineup

VDS-5700 was to reduce the cost as much as possible.

The basic performance, feature, Know-how, etc. inherited from VDS-5800 Series.

VDS-5800Series
Full Auto System

The basic performance,

feature, Know-how, etc.

VDS-5700Series
Semi Auto System

System price is

about 40% down.