INTRODUCTION OF iSYS & System

Vision 2015

To be the World wide PVD & Ion Beam Irradiator Manufacturing Company

"iSYS is committed to building the best"

January, 2007
**[Introduction of Business]**

- iSYS, based on excellent technology and sufficient equipment manufacturing experience, is an energetic venture company where every employee is pursuing to be the best in their respective role while regarding confidence of customers as the ultimate value.

- iSYS has supplied various PVD systems to specialized coating companies for various materials such as plastic, ABS, polymer film, cutting tools, molding, automobile parts and accessory hard-coating.

- iSYS has also an technology transfer of ion beam irradiator from KAERI, is a core device of nano-materials.

- iSYS has developed various plasma sources and systems so as to improve product quality and cost effectiveness.
### Company Introduction

**Sang-Youl, Bae**  
2001. 10. 25  
PVD coating equipment, Ion Beam Irradiator & Vacuum Valves  
Phone : 031-447-6627    Fax : 031-447-7386  
Website : [http://www.isysinc.co.kr](http://www.isysinc.co.kr)

### Portfolio

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>Components &amp; Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Hybrid Arc System (iA)</td>
<td>➢ Vacuum parts</td>
</tr>
<tr>
<td>➢ Ion Beam Irradiator (iB)</td>
<td>➢ 7G Gate Door Valve</td>
</tr>
<tr>
<td>➢ HCD System (HIPS)</td>
<td>➢ Circular Valve</td>
</tr>
<tr>
<td>➢ In-line System (ILS)</td>
<td>➢ Rectangular Gate Valve</td>
</tr>
<tr>
<td>➢ Sputtering System (MSS)</td>
<td>➢ Service</td>
</tr>
<tr>
<td></td>
<td>➢ ISYS Coating Service (iC)</td>
</tr>
</tbody>
</table>
[Company History]

2001. 10 : Foundation of the Intelligent System Inc.
    business type: Manufacture and trading
    Item : PVD coating equipment, Vacuum System, Coating Service,

2002. 03 : Developed rectangular gate valve

2002. 06 : Developed auto pressure gate valves

2002. 11 : Sales contract for the consumables of semiconductor equipment

2003. 05 : Exported Arc Ion plating system to China (model: AIPS-800)

2004. 12 : Developed Circular gate valves

2004. 12 : Export Arc Ion Plating System to Japan (model: AIPS-800)

2005. 03 : Developed 7 Generation Gate door valve

2005. 04 : Registered as a venture company

2005. 05 : Made a know how license agreement with KERI
    (The method and system of large-sized MgO coating)
[Company History]

2005. 05 : Developed new Arc source for decreasing macroparticles
2005. 06 : Designated as a clean business place (KOSHA)
2005. 07 : Selected as a company for the export support (Kyunggi- Do)
2005. 08 : Selected as a promising export company (Kyunggi- Do)
2005. 09 : Developed HCD ion plating system (model : HIPS- 820)
2005. 11 : Selected as a materials & components industry company
          (Ministry of commerce, Industry & Energy)
2005. 12 : Foundation of the ISYS Research & Development Center

2006. 04 : Selected Kyunggi- province promising company and Innovational
          Business Company (INNOBIZ)
2006. 08 : Administered SMBA Project
          ─ Developed High speed coated Arc source without macroparticles
2006. 11 : Selected as a Frontier Kyunggi- Do Internet Trade
2006. 12 : Contracted with KAERI
          ─ Manufacturing Technology of Industrial Ion Beam Irradiator
[Organization Chart]

President

Adviser

R & D

Purchasing Team

Industrial Technology Team

Sales & Marketing Team

Administration Team

System S/W Team

System H/W Team
<table>
<thead>
<tr>
<th>Division</th>
<th>Title</th>
<th>Application Date</th>
<th>Registration date</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patent</td>
<td>The system and method for surface treatment using plasma</td>
<td>02.01.08</td>
<td>05.01.24</td>
<td>No. 0469552</td>
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<tr>
<td></td>
<td>The carrier box for display glass</td>
<td>03.10.17</td>
<td>05.12.08</td>
<td>No. 0536938</td>
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<td></td>
<td>The method and system of large-sized MgO coating</td>
<td>03.07.08</td>
<td>05.07.05</td>
<td>No. 0501044</td>
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<td></td>
<td>Plasma gun for thin film deposition and thin film deposition apparatus thereof</td>
<td>06.06.08</td>
<td>07.01.18</td>
<td>No. 0674031</td>
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<tr>
<td></td>
<td>Arc discharge control device for ion plating and ion plating apparatus thereof</td>
<td>06.06.08</td>
<td>07.05.02</td>
<td>No. 0716264</td>
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<tr>
<td>Utility Model</td>
<td>Back pressure Gate valve</td>
<td>04.12.28</td>
<td>05.03.24</td>
<td>No. 0380587</td>
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<tr>
<td>Design</td>
<td>The carrier of display glass</td>
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<td>04.11.17</td>
<td>No. 0367934</td>
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### Certification

<table>
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<th>Division</th>
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<th>Institute</th>
<th>Certificate date</th>
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<tr>
<td>Certificate</td>
<td>ISO14000 E.M system</td>
<td>DAS</td>
<td>2005. 07</td>
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<td>Venture company</td>
<td></td>
<td>SMBA</td>
<td>2005. 04</td>
<td></td>
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<tr>
<td>ISYS R&amp;D center</td>
<td></td>
<td>KOITA</td>
<td>2005. 12</td>
<td></td>
</tr>
<tr>
<td>Export promising company</td>
<td></td>
<td>SMBA</td>
<td>2005. 08</td>
<td></td>
</tr>
<tr>
<td>Internet trade frontier business</td>
<td></td>
<td>Kyunggi- Do</td>
<td>2006. 04</td>
<td></td>
</tr>
<tr>
<td>Promising company</td>
<td></td>
<td>Kyunggi- Do</td>
<td>2006. 11</td>
<td></td>
</tr>
<tr>
<td>INNOBIZ</td>
<td></td>
<td>SMBA</td>
<td>2006. 11</td>
<td></td>
</tr>
</tbody>
</table>
[Products of ISYS]

**PVD System – iA Series**

**Systems**
- i70A, i90A, i120A, i150A
- Hybrid Arc system is a main ion plating for a hard film coatings

**Features**
- Above 90% ionization
- High energy ion plating (60~100eV)
- High adhesion (Arc + Sputter + E/B)
- New Arc source for Decreasing of macro particle
- Hybrid method (HCD+Arc+Sputter)
- Auto process & compiling database
- Self diagnosis system (Leak & Insulation)
- Movable cart with rotation unit
- Application: Cutting Tools, Automobile, Electronic part & molds
Ion beam irradiator is an equipment of surface modification into inner surface with accelerated metal or gas ion. iB series are improving a performance of materials like a metal, ceramic, polymer and so on.

Features

- Ion beam energy: below 300KeV
- Ion beam current: 5-50 mA
- Mass analyzer, Acceleration tube, scanner, MQD
- Mechanical, electric, optical & chemical properties change
- Hybrid method (IB+Arc+Sputter)
- Application: Prevent static electricity, Electromagnetic shielding, doping, Hydrophilic/Hydrophobic treatment
PVD System – HIPS Series

Systems

- HIPS - 520,820
- HCD Ion plating system, as an equipment of using a hollow cathode discharge, which holds a high energy of low voltage and high current, coats a thin film on the substrate by vaporizing the material in a crucible

Features

- Ultra wide electronic beam (~300A)
- Reactive characteristics & excellent adhesion (Above 25% ionization)
- Insulated material plating possible
- Self diagnosis made before processing
- Auto process in every step
- Application: TiN (Cutting tools & decorate)
  - Hard Coating
  - Metal Coating
[Products of ISYS]

PVD System – ILS Series

Systems

- ILS - 740,920,1460,1720
- In-line system is an equipment of connecting all the process chambers of various batch process for the productivity improvement.

Features

- Suitable to large size glass and sheet
- High productivity & reliability
- Full Auto process
- Compiling database for each chamber
- Large sized plasma cleaning system
- Application: ITO(Plat Panel Display), CrN(Automobile parts)
  TiN(Decoration), Hard Coating(Cutting&mold)
  Metal Coating(Electric part)
Magnetron sputtering system is an equipment used in coating of a thin film on the substrate by forcing the atoms to bounce out and accelerating it from the collisions of high-energy ions on the target surface.

- Long distance coating with UBM mode
- Very smooth surface
- Fine & High-density films
- High yield Target Erosion (40%)
- Hybrid system (UBM+Arc+HCD)
- Application: DLC, MoS2, TiAl(metal), TiAlN, TiCN, TiN, CrN Hard coating
[Products of ISYS]

PVD System – Valves

- Lighter than competitor’s valve of same size
- Easy maintenance and small vibration
- Possible to make a non-standard size
- Leak rate is better than $2 \times 10^{-9}$ sccm/sec
- >100,000 Life reliability test
[Diagram of I90A]

Arc⁺HCD⁺Sputter

- HCD: Cleaning Process
- Arc: Main coating
- Sputter: Functional coating (OPTION)
- Note: HCD Coating (OPTION)
### Features of i90A

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Method</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>Auto &amp; manual</td>
<td>Self diagnosis (vacuum, insulation) &amp; Full auto system</td>
</tr>
<tr>
<td>HCD Source</td>
<td>Electron Acceleration type</td>
<td>Ion etching &amp; excellent adhesion (≥80N)</td>
</tr>
<tr>
<td>Arc Source</td>
<td>New Arc source</td>
<td>Ra≤0.06um (criterion, TiAlN 3um, bare material Ra=0.03)</td>
</tr>
<tr>
<td>Pump</td>
<td>Rotary/booster pump</td>
<td>Second pump of Diffusion</td>
</tr>
<tr>
<td></td>
<td>Diffusion pump</td>
<td>High Vacuum pump/Main process pump</td>
</tr>
<tr>
<td>Heater &amp; TC</td>
<td>40KW</td>
<td>Maximum heater capacity (High temperature)</td>
</tr>
<tr>
<td>View port</td>
<td>Slim type</td>
<td>Wide view (option : CC camera)</td>
</tr>
<tr>
<td>Shutter</td>
<td>Arc &amp; Sputter shutter</td>
<td>Prevent contamination &amp; excellent performance</td>
</tr>
<tr>
<td>POWER</td>
<td>Arc, HCD, Bias power</td>
<td>Stable power supplies (made in Poland)</td>
</tr>
<tr>
<td>One body</td>
<td>Whole unit</td>
<td>Prevent dust contamination &amp; Design</td>
</tr>
<tr>
<td>Vacuum Gauge</td>
<td>Full range, Pirani gauge</td>
<td>Long life time</td>
</tr>
<tr>
<td>S/W program</td>
<td>Ver.3.1</td>
<td>Real time graph &amp; data base (include Analysis program)</td>
</tr>
<tr>
<td>Hot Cooling system</td>
<td>Max. 80°C</td>
<td>Blocking dew condensation &amp; erasing out gas</td>
</tr>
<tr>
<td>Sputtering system (Option)</td>
<td>High yield target/Power</td>
<td>Target yield ≥ 40%</td>
</tr>
<tr>
<td>HCD Coating system (Option)</td>
<td>Hybrid Coating (HCD)</td>
<td>HCD coating with high power supply</td>
</tr>
</tbody>
</table>
[New Arc Source of i90A]

Steered + Random

Smooth Roughness

Double Shield

Shutter

Patent Number of Arc Source : No. 0716264
**[HCD Ion Etching of i90A]**

**Feature:** Flow lots of Ar ionization with HCD Gun

**Effect:** IEGD (Ion enhanced Glow Discharge) Ion etching
[Hot Cooling System of i90A]

Feature: Close circulation system with water heater (about 30°C)
Effect: Blocking dew condensation of chamber wall
Removal outgassing of chamber using a warm water circulation

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[Surface Morphology of i90A]

<Note> Sample: HSS Ra = 0.03 um
Film: TiAlN 3.0 um
Optical microscope x400

Conventional Arc Source
Ra > 1 um

New Arc source
Ra ≤ 0.06 um
Rz = 0.47 um
Rmax = 1.50 um
[Main Window of i90A]

Batch No.  
2006-08-14-1

Recipe File  
TICNTEST

Setting Time  
35

Passed Time  
1:29

Coating #4

Auto Mode  
Manual Mode

System Start  
Auto Vent

Auto Start  
Stop

Unit  
Chart

Recipe  
Configure

Alarm  
Exit

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Diagram Window of i90A
[Recipe Graph of i90A]
[Photos of iA Series]

[Specifications]
Chamber size : 900L x 900W x 900H
Coating zone : 540H x 600φ
Axis : 30Kg / 150φ x 8 axes
Source : 5 inch circular x 6EA

[Specification]
Chamber size : 1500L x 1500W x 1000H
Coating zone : 540H x 1100φ
Axis : 30Kg / 150φ x 16 axes
Source : 5 inch circular x 12EA
[Large Area Ion Beam Irradiator]

[Specifications]
Energy: 5 ~ 50KeV
Ampere: 5 ~ 50mA, 10 ~ 100mA
Area of Irradiation: 30cm x 15cm
## [i90A Cutting Test in Drills]

<table>
<thead>
<tr>
<th>Work piece</th>
<th>φ 6.0</th>
<th>φ 10.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>S50C</td>
<td></td>
<td>S55C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>rpm (min⁻¹)</th>
<th>1,600</th>
<th>855</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>feed (mm/rev)</th>
<th>30</th>
<th>30</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>depth (mm)</th>
<th>0.17</th>
<th>0.23</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Cutting holes (cutting length m)</th>
<th>3,300hole (53m)</th>
<th>1,280hole (38m)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Cutting Oil</th>
<th>Emulsion</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Machine</th>
<th>URAWA UB75</th>
</tr>
</thead>
</table>

### Graphs

#### Φ 6.0

- A company 1
- A Company 2
- ISYS TiAlN 1
- ISYS TiAlN 2

#### Φ 10.0

- A company 1
- A company 2
- ISYS TiAlN 1
- ISYS TiAlN 2
HCD coating film = TiCN/TiN  3.05um, Hardness[ Hv] =2563

Ra = 0.0148um, Rmax = 0.3090um, Rz=0.1798um

Adhesion & Surface morphology
[HIPS- 820 Cutting Test in milling]

Cutting Conditions : V=150m/min, f=0.1mm/rev, d=3.0mm, wet,
W.P=SCM435, GBA43L200
[HIPS- 820 Cutting Test Result]

22 min

42 min

75 min

93 min

比較

HIPS
[HIPS- 820 Cutting Test Result]

22min

42min

75min

93min

比較

HIPS