Angelantoni Group
Corporate Organization Details

KENOSISTEC
ATT Test Technologies
ACS
ATT INDIA
ATT UWS
ATT ASIA PACIFIC
ATT FRANCE

ALS
Angelantoni Life Science
AG AIC AS STERIL

ASE
Archimede Solar Energy Srl

ACT
Angelantoni Clean Tech

TURBOALGOR
ELIANTO
Equipment for thin film deposition system

To design and fabricate vacuum equipment for thin film deposition in nanotechnology, renewable energy, telecommunications, microelectronics, optical instrumentation and automotive, as well as for decorative and functional applications.

To develop innovative and competitive solutions for research and industrial large area/high throughput processes, involving our human resources who are fundamental contribute to our success.

Via delle Scienze, 23
20082 Binasco (MI) - Italy

• 30 km away from Airport of Linate
• 65 km away from Airport of Malpensa
• 75 km away from Airport of Orio al Serio
KENOSISTEC
UHV & Thin Film Deposition

- 600 sq meters assembly
- 400 sq meters workshop
- 300 sq meters warehouse
- 200 sq meters offices
- 18 employees

→ eventual expansion to 1600 sq meters area
  (in the next 3 years)
KENOSISTEC
Customer Targets

• R&D Institutions such as Universities and Government Research Centres
• Teaching Basic Material Science and Physics University Departments
• Companies involved in R&D, limited production and production
• Semiconductor companies requiring moderate production and cheap but reliable products.
• New customer with their own process to evaluate and to test for real production
• Companies interested in decorative and functional coatings, like: taps, fittings, handles, household, fashion, glasses, automotive, jewelry, cosmetics, lighting, …
KENOSISTEC
Italian key Customers
KENOSISTEC
Foreign key Customers

- University of Cambridge
- EPFL - Losanna
- Fraunhofer Institute - Jena
- Sintef - Svezia
- Siemens - Erlagen
- Arcelik
- CAS - Beijing
- IMECAS - Beijing
- HGST Research – San Jose
- PRREV Surface Engineering Vagos
- International Iberian Nanotechnology Laboratory - Braga
- CSIR Strategic Procurement Unit - Pretoria
- China Industry Group, INST. 214 - Bangbu
- China Electronics Tech. Group, INST. 10 - Chengdu
KENOSISTEC
Main Products

1. Vertical Sputtering
   (with single or double rotation carousel)
2. Horizontal Sputtering
3. Confocal Sputtering
4. Thermal, E-beam & Effusion Cell Evaporators
5. Cathodic Arc
6. Gas Sensor Test
7. PECVD System
8. Cluster
9. Large Area Coaters
10. Vacuum Components & Deposition Sources

kenosistec.com  +39 02 90 55 200  info@kenosistec.it
KS 80 V: System designed for deposition on 8” wafers

- 6 vertical cathodes
- 8” x 8” Wafers
- Fast entry chamber (load lock)
- Wafers are placed in a planetary holder rotating around a vertical axis
- While the holder rotates the wafers spin around their axis
KENOSISTEC
Sputtering and Cathodic Arc

KSA 75 V: Batch vertical Systems for combined techniques

- HiPIMS* Magnetron Sputtering source
- Dual Magnetron Sputtering source
- Cathodic Arc Evaporation sources
- Carrousel with double rotation for 3D samples
- DC pulsed for Bias** and Etching

Techniques for tribological*** applications

*HiPIMS High Power Impulse Magnetron Sputtering
** Bias: low voltage applied on substrate to accelerate ions on substrate

*** Tribological: Science of the mechanisms of friction, lubrication, and wear of interacting surfaces that are in relative motion
KS 300 In-Line
System used for research in the thin film photovoltaic technology
- Nr. 3 cathodes with length up to 12”
- Heating station for substrate
- Configured as “cluster tool”
- RF and DC pulsed Power supply
- Substrate up to 200 mm
Confocal Sputtering for a real co-sputtering and development of new complex processes

- R&D oriented
- Good uniformity with small targets
- Simple or very complex systems

Some Models:
- KS 300 C
- KS 800 C
- KS 1000 C
KS 800 Cluster: R&D Cluster system in Confocal Configuration

System used for research and semi-industrial production in semiconductor field with an advanced software control to get a full automated managing of wafers recipe

- Automatic Load-Lock
- Transfer chamber
- Plasma cleaning module
- Oxide deposition module with 4 x 4” Cathodes
- Metal deposition module with 4 x 4” Cathodes
KE 1000 ETI

- E-gun power up to 15kW
- Up to 20 crucibles for E-beam
- Nr. 2 Thermal Evaporators sources
- Ion Assisted Deposition
- DC Plasma cleaning
- Substrate heating up to 500°
- Optical Monitoring of thickness
KE 500 ET: Thermal and E-beam evaporator with special Load-Lock

Special Load Lock with separate carrier and Getter Pump
KE 500 ST-SE-SET:
Thermal + e-beam + sputtering can be integrated in the same system

- Thermal evaporators and/or e-beam sources
- Insulated substrate for “bias” and “etching”
- Substrate holder heatable up to 500°C
KSA 1300 V: Batch vertical System for combined techniques
one system, many possibilities

The system is designed and manufactured to produce coatings on metal, ceramic and plastic substrates, even chromium or nickel plated. It is equipped with:
Many substrates can be accommodated into a carousel for high productivity purposes.
KENOSISTEC
Vertical Sputtering and Arc system

**KSA 1300 V:** Carousel with double rotation for 3D substrates

- Samples with different size and shape can be loaded
- Good uniformity of samples using carousel in continuous double rotation
- Carousel with Nr.13 shafts, useful height 1200 mm
- Special shield with easy mount / dismount for quick maintenance
- A special trolley for a quick load / unload of the carousel
KSA 1600 V: General Configuration

- Two pairs of cylindrical sputtering sources for better use of the target, with fast maintenance and quickly mount/dismount of cathodes
- N.10 Cathodic Arc Evaporation sources for decorative and functional coatings
- PECVD source for SiO₂ transparent deposition (before and after PVD deposition)
- Carrousel with double rotation for 3D samples to have a better uniformity
- DC pulsed Power Supply for bias and plasma cleaning of the samples
- Heating elements for better adhesion of the coating
- Polycold for water fast pumping
Our costumers use our systems to produce coatings for applications either in the **functional field** (moulds, end-mills, cutting tools, machinery components) and in the **decorative field** (cutlery, handles, taps, jewellery).
Hi.P.Po. is a new generation sputtering source whose purpose is **large production**. As it guarantees an high deposition rate, it is considered the perfect **alternative to the metallization**. In addition, nitrides and carbides can be deposited as well, which means more colors and more possibilities.

The target (i.e. the material to be deposited) has cylindrical geometry to deposit in all the directions simultaneously. In addition, thank to a motorized magnetic array, the target is consumed uniformly and almost entirely.
Deposition rate >10⁻²₀ times higher than traditional planar cathodes. This makes Hi.P.Po. competitive against traditional metallization, more reproducible and tunable.

Energy consumption <1/₃ compared to traditional sources for the same deposited thickness.

Savings on target material >65%, 2/3 of material cost savings. Thanks to material use optimization, the routine target exchange will occur less frequently, typically one out of seven compared to standard technologies.

Chamber volume reduction (of about 40%), even with same carousel used in traditional batch coater with planar magnetron, is possible to reduce the pumping time per cycle.
KENOSISTEC
Gas sensor testing system

- A fundamental tool for Quality Control and to speed up R&D results
- High throughput. Up to 10 Gas Sensor Heads
- Ultra High Purity Gas compatibility
- Fully automatic process control

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Inner tube cover by sputtering

The space between the inner and outer tubes is evacuated for:

- reduced convection losses (wind!)
- longer lifetime (possible oxidation of coating at high T)
In-Line Sputtering Coating System for ASE Angelantoni Group

During mechanical assembly

Carrier with tubes

At site in Massa Martana
In-Line System for Photovoltaic CdTe modules

Glass sheets move continuously through the different process chambers traveling either vertical or in horizontal

Vertical Line
(actually “subvertical” position about 5°inclined)
In-Line System for Photovoltaic CdTe modules
Horizontal Line
In-Line System for Photovoltaic CdTe modules

Production equipment: **2 modules per minute**

Typical layout of a deposition section (e.g. TCO):
- Entrance Load lock chamber
- Heating tunnel
- Deposition stages (mostly magnetron)
- Cooling tunnel
- Exit Load lock chamber

BCO (20 mt)

p-n junction (63 mt)

TCO (29 mt)

laser scribing
KENOSISTEC
Vacuum components

A wide choice of manual and motor driven motion devices and manipulators

UHV Chamber

Accurately positioning of many flanges in a complex UHV chamber is our job
Rectangular and Circular Magnetron Sputtering Sources with different dimensions

- DC & RF Circular Magnetron Sputtering of 2”, 3”, 4” for standard materials and for ferromagnetic materials
- DC & RF Rectangular Magnetron Sputtering of 8” x 3”, 12” x 3”, 16” x 2”, 16” x 5”, 22” x 5”
- Rectangular Magnetron for HiPIMS Sputtering and Dual Magnetron Sputtering