Oerlikon Leybold Vacuum solutions
UNIVEX Systems

UNIVEX

- UNIVEX is an universal experimentation system which allows the user to work in a small scaled,cost effective but technology high end range to develop/research for

  - New Coating processes
  - Material research
  - Nanostructures
  - Layer performance

and finally set the basics for production scale

- In general all UNIVEX are box coater design except our most mature 300 which is layout as a bell jar

- The alphabetic character G stands for Gloveboxystem – The UNIVEX is integrated into a Glovebox

- The alphabetic character C stands Clustersystem – multi chamber

Application Examples
UNIVEX for Coating Application

- Anti reflection coatings
- Beamsplitters
- Semiconductive layers
- Lift off processes for structured layer designs

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Application Examples
UNIVEX for Dactyloscopy Applications

- Fingerprints
- Technology: thermal evaporation

Application Examples
UNIVEX for dental implants

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- Biologically compatible coatings
- Highly wear resistant
- Chemical resistant

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UNIVEX for consumer applications

- Diffusion barrier for water
- Light absorbing layers

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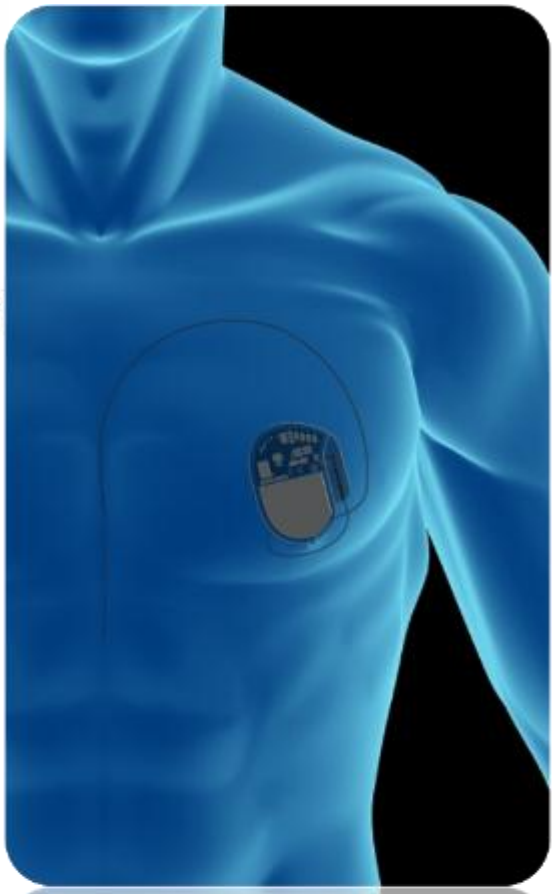
UNIVEX for Medical Application



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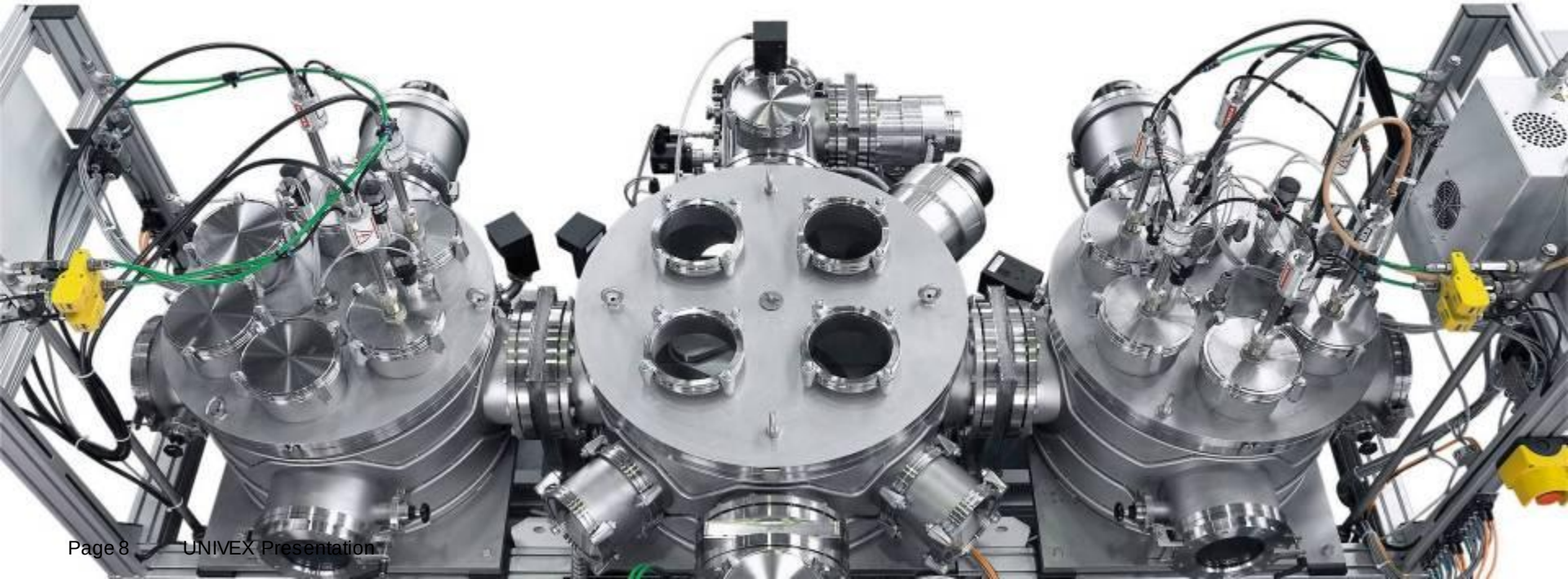
UNIVEX
Complexity

UNIVEX Systems are a combination of various products and high sophisticated software

- Sputter Sources
- Chambers
- Electrical components
- Compressors
- Heater & Cooler
- Valves
- Vacuum pump system
- Operating system
- Thermal Vaporatorers

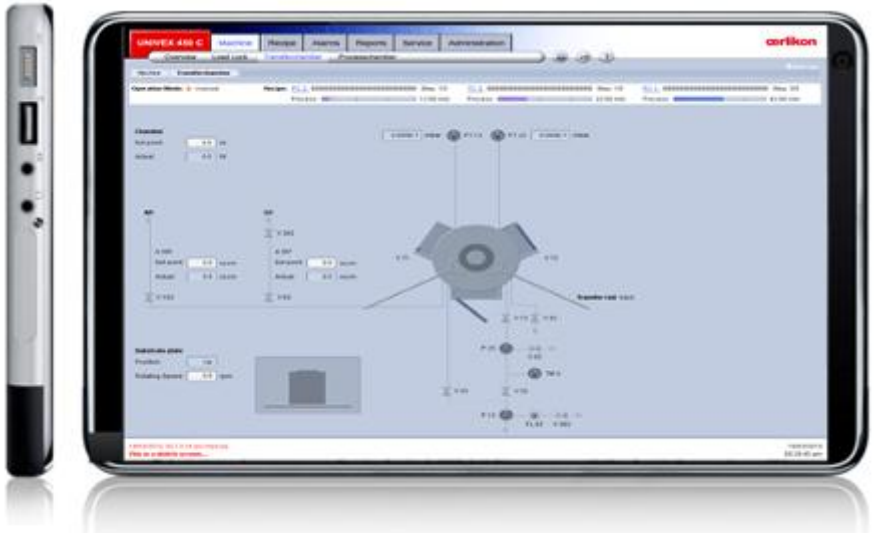


Visualization-Operating
Operation: Touch Screen

- STN or TFT display
- Display size 5.7-in. or 12.1-in.
- Additionally 5 function keys
- Insensitive and resistive Touchscreen
- Control and Monitoring with mobile devices

Visualization-Operating
Operation: Touch Screen

- Free layout of the user interface
- Soft keys (function dependent on the display)
- Display of values also by way of curves
- Message buffers for a total of 3000 messages
- Recipe administration and recipe memory



One Family to fulfill all customer needs
Our complete family of lab coaters

UNIVEX

250 | 300 | 350 | 350G | 450 | 450C | 600

solutions

UNIVEX 250
The entry model box coater

- Table top system 250mm wide vacuum chamber
- Horizontal high vacuum pump connection
- Turbomolecular pump system integrated in the cabinet
- Manual system operation

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UNIVEX 250
The entry model box coater

Typical applications

- Manually controlled coatings of single substrates in research, development and prototyping
- Thermal evaporation, electron beam evaporation and RF & DC sputtering
- Max. substrate diameter: 200mm fixed/rotary substrate

UNIVEX 250
The entry model box coater

Advantages

- Cost-effective starter system
- Simple operation
- Small dimensions
- Integration of any process components
- Convenient access to the installed process components
- Modular extendable

UNIVEX 300
The entry model bell jar system

- Desk top system with 300mm vacuum bell jar
- Horizontal high vacuum pump connection
- Turbomolecular pump system integrated in the cabinet
- Manual system operation

UNIVEX 300
The entry model bell jar system

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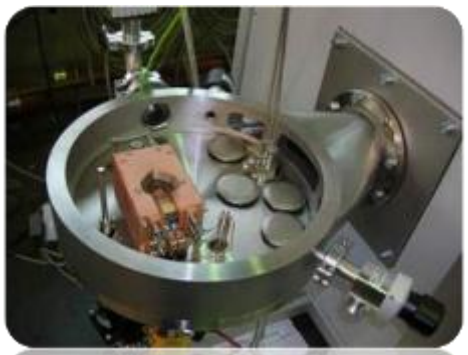
Typical applications

- Manually controlled coatings of single substrates in research, development and prototyping
- Thermal evaporation as most frequently used principle, furthermore electron beam evaporation or DC sputtering
- Max. substrate diameter: - 250mm fixed substrate - 100mm rotary substrate




solutions

UNIVEX 300
The entry model bell jar system

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Advantages

- Cost-effective starter system
- Simple operation
- Small dimensions
- Integration of any process components
- Convenient access to the installed process components
- Modular extendable

solutions

UNIVEX 350
The universal lab coater

- Box coater with 350mm wide vacuum chamber
- Modular rack system
- High vacuum pump connection at the chamber back side
- PLC controlled system operation with various HMI interfaces

UNIVEX 350
The universal lab coater

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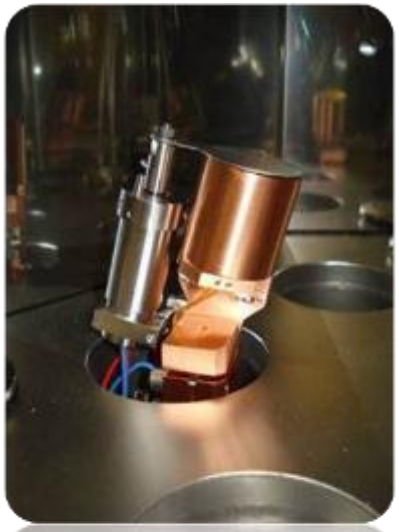
Typical applications

- Manually controlled or automated coating batches in research, development and pilot production
- Thermal evaporation, electron beam evaporation, RF/DC sputtering and IBAD as single or combined processes
- Max. substrate diameter: 320mm



solutions

UNIVEX 350 double chamber
The universal lab coater

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Advantages

- Manually Flexible experimental system
- Compact design, small footprint
- Customized system configuration
- Integration of any process components
- Modular extendable
- Comfortable system operation via PC/Laptop, touch panel or mobile devices

solutions

UNIVEX 350G
The glove box system

- Box coater with 350 or 450mm wide vacuum chamber
- For the connection to a glove box
- Front side sliding door
- Back side hinged service door
- Horizontal high vacuum pump connection
- PLC controlled system operation with various HMI interfaces

UNIVEX 350G
The glove box system

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Typical applications

- Automated coating batches in research, development and pilot production
- Thermal evaporation, electron beam evaporation, RF/DC sputtering and IBAD as single or combined processes
- Max. substrate diameter: 430/580mm

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UNIVEX 350/450G
The glove box system

Advantages

- Comfortable process access via front side sliding door
- Convenient service access via back side hinged door
- Customized system configuration
- Integration of any process components
- Comfortable system operation via PC/Laptop, touch panel or mobile devices

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UNIVEX 450
The big brother of UNIVEX 350

- Box coater with variable vacuum chamber size
- Modular rack system
- High vacuum pump connection at the chamber back side
- PLC controlled system operation with various HMI interfaces

UNIVEX 450
The big brother of UNIVEX 350

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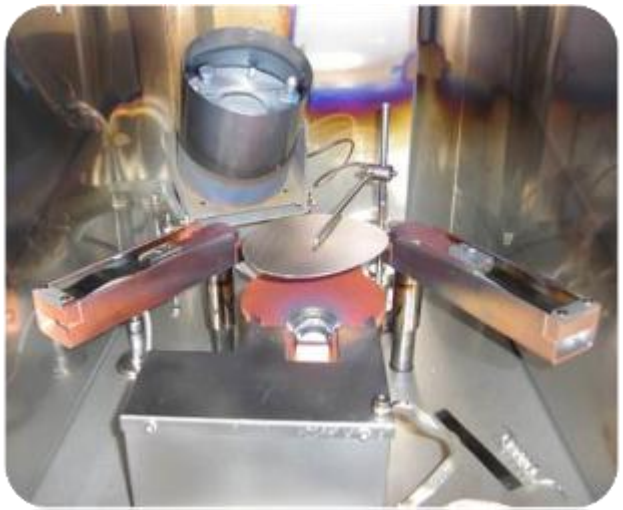
Typical applications

- Automated coating batches in research, development and pilot production
- Thermal evaporation, electron beam evaporation, RF/DC sputtering and IBAD as single or combined processes
- Max. substrate diameter: 430/580mm



solutions

UNIVEX 450
The big brother of UNIVEX 350

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Advantages

- Flexible experimental system
- Compact design, small footprint
- Customized system configuration
- Integration of any process components
- Modular extendable
- Various pump system combinations available, e.g. TMP, cryo, diffusion & dry or wet FV pumps
- Comfortable system operation via PC/Laptop, touch panel or mobile devices

solutions

Univex 600

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Advantages

- Chamber width 600mm
- Compact design, small footprint
- Customized system configuration
- Integration of any process components
- Modular extendable
- Various pump system combinations available, e.g. TMP, cryo, diffusion & dry or wet FV pumps
- Comfortable system operation via PC/Laptop, touch panel or mobile devices

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UNIVEX (450)C
The cluster tool solution

- Customized coating system with several process chambers
- Central load lock system
- Central transfer chamber with vacuum robot
- Separate pump systems for each chamber
- PLC controlled system operation with various HMI interfaces

UNIVEX (450)C
The cluster tool solution

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Typical applications

- Automated coating sequences in research, development and pilot production
- Mostly equipped for sputtering processes
- Flexible coating sequences with high requirements for layer combinations, variety of materials, wafer throughput or process complexity

solutions

UNIVEX (450)C
The cluster tool solution

Advantages

- Customized system design
- Programmable, recipe controlled process sequence
- Full automated process control
- Excellent process vacuum, low residual gas contaminations
- Comfortable system operation via PC, Laptop or mobile devices

solutions

UNIVEX
Systems for experimental vacuum Coating

- **Univ**ersal **Ex**perimentation System
- Every UNIVEX is customized to the customer´s needs based on subassemblies
- No off-the-shelf systems
- Customized software structure from simple manual to fully automated operation
- Easy-to-use due to PC/Laptop, touch panel or mobile devices operation
- Long-term use feasible, due to high flexibility
- Industrial approved components
- Modular expandable design
- Clean-room integration possible

Customer References

United States
- University of Texas, Austin
- University of North Texas
- University of Notre Dame

South America
- Nat'l Atomic Energy Commission (Argentina)

Asia
- Indian Institute of Science (India)
- Bhart Electronics Ltd.(BEL) (India)
- BE Delf Optics. (India)
- National University Changsha (China)
  Beijing University (China)
- Nanyang Technological University (NTU) (Singapore)
- National University of Singapore (NUS) (Singapore)

Europe
- UnivHettich Zentrifugen (Germany)
- Catholic Univ. of Nijmegen (Netherlands)
- University of Leeds (England)
- EMPA Dübendorf (Switzerland)
- University of Bangor (Wales)
- Universitat Linz (Austria)
- Institut fur Mikrotechnik (Germany)
- FH Regensburg (Germany)
- Universite Neuchatel (Switzerland)
- Joanneum Research Weiz (Austria)
- Fraunhofer EMI Freiburg (Germany)
- Lumix GmbH (Berlin)
- Istanbul Technical Univ (Turkey)
- University Politecnica de Catalunya (Spain)
- University of Würzburg (Germany)

To be continued

Some technical aspects

to

keep in mind

Technology Overview

Univex 250 -350 (350G)

- All evaporation and sputter components could be implemented
- PVD Processes incl. IAD

- Limitation is only by size of chamber

Univex 450 – 600 Univex (450) C

- PVD and PeCVD components could be implemented
- IAD processes

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To be considered, speaking the language PVD- Evaporation systems

- In general all evaporation technologies are based on a thermal evaporation
- Language: Thermal evaporator , meant is a component which simply uses high current via a „boat“ filled with the coating material
  - Most mature technology to evaporate material
  - Suitable for low melting materials
  - Low cost technology
  - Limited process flexibility
  - Limited control parameters
    - Uniformity difficult to effect
    - Sensitive material and evaporator handling
  - Most common system for high material ammount

To be considered, speaking the language Language: Beam evaporator, Gun, e-beam

- Evaporation source is an electron beam source where the electron beam hit´s the material and warms it up to melting point

- Meanwhile nearly all high end beam guns use a 270° deflection of the beam

  Advantage:
  - no coating material will fall onto the filament
  - Filament is protected from cross coating

  Disadvantage:
  - Permanent magnets needed for basic deflection (costs)

- Multi beam deflections (figures) programmable
- High melting point materials possible
- Due to multi pocket crucibles several materials can be evaporated
- Multible control parameters

To be considered, speaking the language Language: Ion Gun, IAD, Ion source

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- Ion assist deposition IAD,
- Ion gun is used to effect layer performance in regards of:
  - Stochiometric
  - Durability
  - Surface roughness
  - Refractive index
- Working range is mid of 10-4 mbar
- Process reactive gases e.g. O2 could run directly thru source to enhance ionisation
- Simultanious operation with EB Gun or Thermal evap
- Ion gun for etching
- Replacing the mature glow discharge which has a relative low effect
- Working range is mid 10-4 mbar

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Application examples

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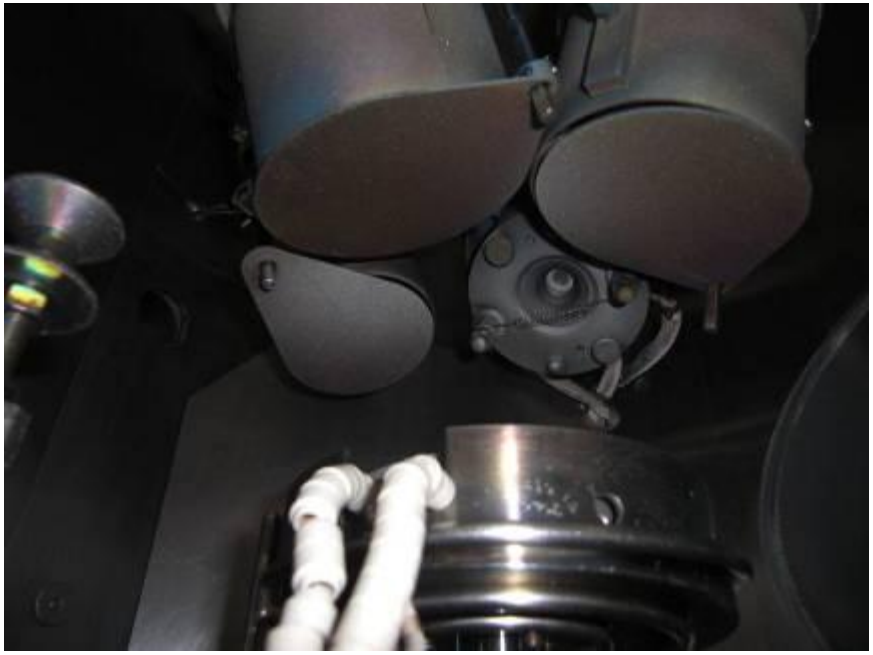
IAD for lift off processes



IAS- Ion assist sputtering

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To be considered, speaking the language IAS Ion assist Sputtering

- Very unusual/seldom configuration
  - This configuration requires a so called differential vacuum system within the chamber
  - Pressure range sputtering mid to upper 10-3 mbar range
  - Pressure range Ion gun mid to upper 10-4 mbar range
  - This simpy means that the Ion source should be located away from the sputter sources and has to get it´s own pump system

To be considered, speaking the language Sputter system

- **Sputtering** is a process whereby atoms are ejected from a solid target material due to bombardment of the target by energetic particles.

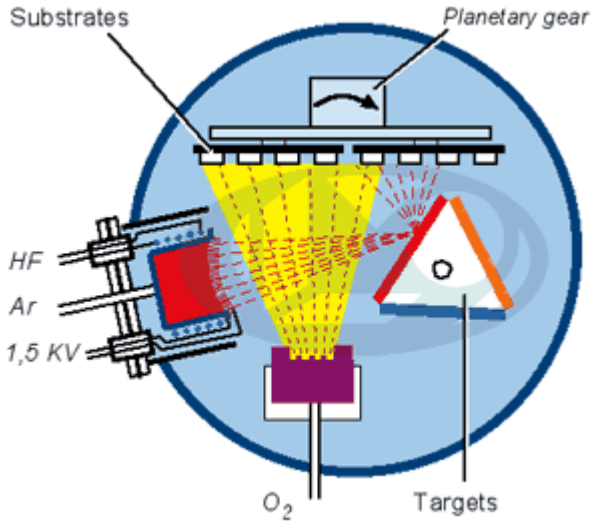
- An important advantage of sputter deposition is that even materials with very high melting points are easily sputtered while evaporation of these materials in a resistance evaporator or E-Beam Gun is problematic or impossible.

- Substrate Target distance in the range of 100mm
- Therefore chambers could be much lower than for Evap system
- Pumpsystem similar to Evap system but mostly more expensive due to the use of regulation valves (High vac valve, VAT Gate valve) to minimize gas flows

To be considered, speaking the language Additional coating technologies

- HIPIMS High Power Impuls Magnetron Sputtering
  - newest technology for hard and wear resistant coatings
  - Powersupplies used which create in an impuls huge pwoerlevels (MW scale)

- Ion Beam Sputtering IBS (IBSD)
  - Erosion of a target material using an Ion source
    - Advantage: target changer could be used



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A comment at the end

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As you have send there is wide range of process technologies

and even within one technology there are endless variations of how to do things

e.g. evaporation for semicon is totally different to Optics and within Optics it is

essential to know if the customer works in EUV,UV,VIS,NIR or IR range

Another major factor is also the knowhow about the substrates which are used

That´s why somebody smart created a fellow called ***PROCESS ENGINEER***

As more we know as better we can find a SOLUTION(S)

solutions