



**ADVANCED WAFER COATINGS**

**scia Magna 200**

## Features & Benefits

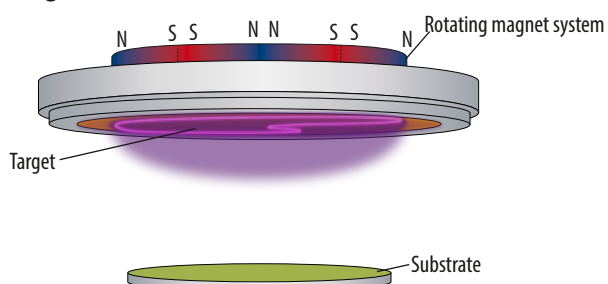
- RF bias for conformity and stress control
- Superior uniformity with rotatable substrate holder
- Low substrate temperature with helium cooling contact and electrostatic chuck
- High deposition rates with reactive sputtering in unipolar and bipolar mode
- Variation of film properties by adjustable energetic substrate bombardment
- Co-sputtering with confocal arrangement of magnetrons

## Applications

- Temperature compensation films for TC-SAW devices ( $\text{SiO}_2$ )
- Piezoelectric films with excellent and defined crystal orientation ( $\text{AlN}$ ,  $\text{AlScN}$ ) and electrode materials ( $\text{Mo}$ )
- Optical high- and low-refractive coatings ( $\text{SiO}_2$ ,  $\text{TiO}_2$ ,  $\text{HfO}_2$ ,  $\text{ZrO}_2$ ,  $\text{Nb}_2\text{O}_5$ ,  $\text{Ta}_2\text{O}_5$ )
- Electrical insulating films ( $\text{Si}_3\text{N}_4$ ,  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ )
- Co-sputtering of metals and alloys

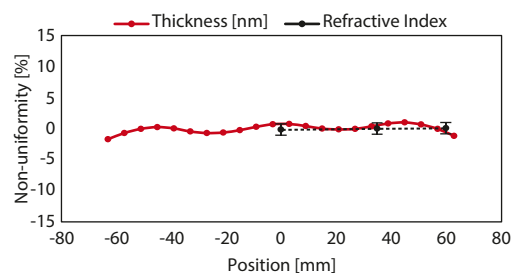
## Principle

- Magnetron Sputtering in several configurations:
  - Single magnetron with rotating magnetic field, magnetron dia. > substrate dia. (see picture) or
  - Up to 4 magnetrons in confocal arrangement, magnetron dia. < substrate dia. (rotation required) or
  - DRM 400 from Fraunhofer FEP with two concentric targets, magnetron dia. > substrate dia.



## Application Example

- Reactive sputter deposition of  $\text{SiO}_2$  in confocal arrangement with bipolar pulsed DC on a 150 mm dia. Si wafer
  - Uniformity variation < 0.8 % ( $\sigma/\text{mean}$ ), stress -300 MPa, deposition rate 7 nm/min
  - Refractive index of 1.48 indicates stoichiometric and dense  $\text{SiO}_2$  deposition



Thickness and refractive index on a 150 mm dia. wafer

## Technical Data

<b>Substrate size (up to)</b>	200 mm dia.
<b>Substrate holder</b>	Water-cooled, helium backside cooling contact, rotation up to 20 rpm, optional RF bias, electrostatic clamping and wafer heating (up to 750 °C)
<b>Sputter sources</b>	Magnetron with rotating magnetic field or up to 4 magnetrons in confocal arrangement or Double Ring Magnetron (DRM 400) from Fraunhofer FEP
<b>Sputter modes</b>	DC in uni- or bipolar pulse mode (up to 2 x 10 kW) and/or RF (up to 6 kW, 13.56 MHz)
<b>Typical deposition rates</b>	$\text{SiO}_2$ : 90 nm/min (single), 7 nm/min (confocal), 180 nm/min (DRM 400)
<b>Uniformity variation</b>	$\leq 1.5\%$ (single), $\leq 0.8\%$ (confocal), $\leq 0.5\%$ (DRM 400) * ( $\sigma/\text{mean}$ )
<b>Base pressure</b>	$< 1 \times 10^{-6}$ mbar
<b>System dimensions (W x D x H)</b>	2.70 m x 1.10 m x 1.60 m, for single chamber with cassette handling (without electrical rack and pumps)
<b>Configurations</b>	Single chamber with single substrate load lock or cassette handling, cluster system with up to 5 process chambers and cassette handling
<b>Software interfaces</b>	SECS II / GEM, OPC

