

# ECR薄膜の光学特性

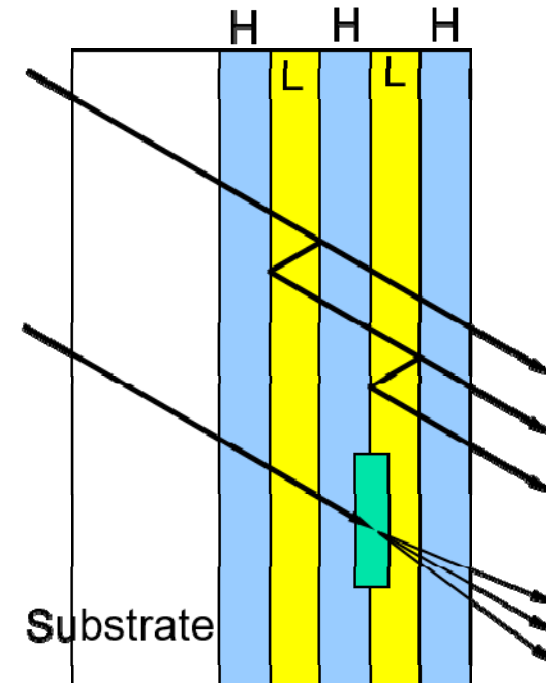
Optical Properties of ECR Films



# 多層膜光学フィルタ、HR/ARミラー

Muti-layer Optical Filter, HR/AR Mirror

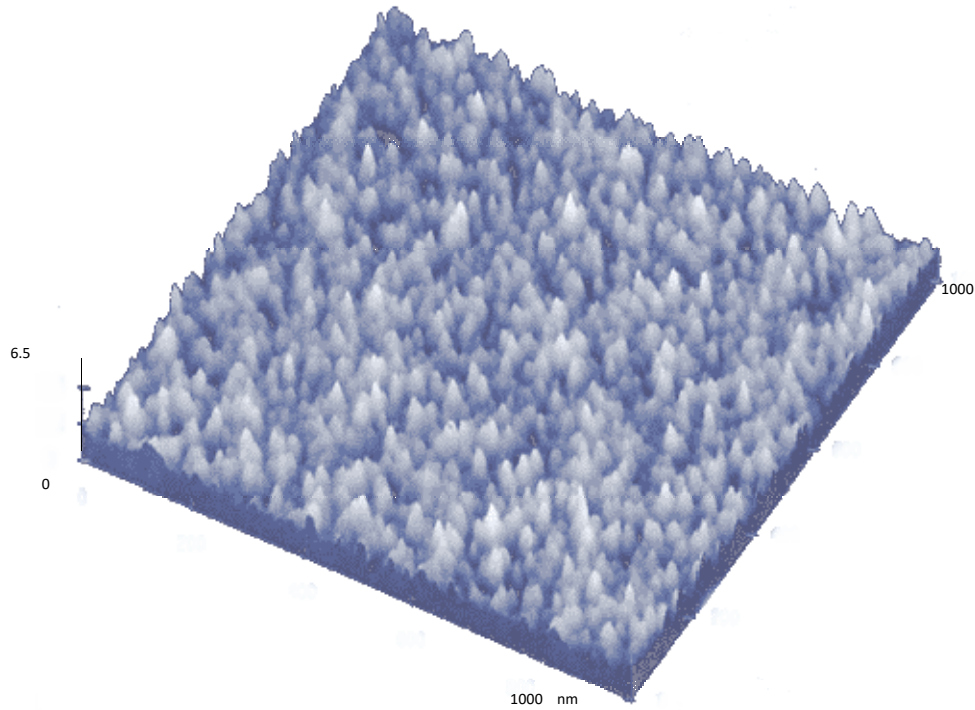
- Substrate : compound material, glass
  - Low temperature deposition
- Multi-reflection
  - Small scatter = Smooth surface/interlayer
  - &
  - Precise optical length = Constant refractive index (n)
  - Uniform film thickness
  - &
  - Small attenuation = Small extinction coefficient (k)



# 表面平滑性

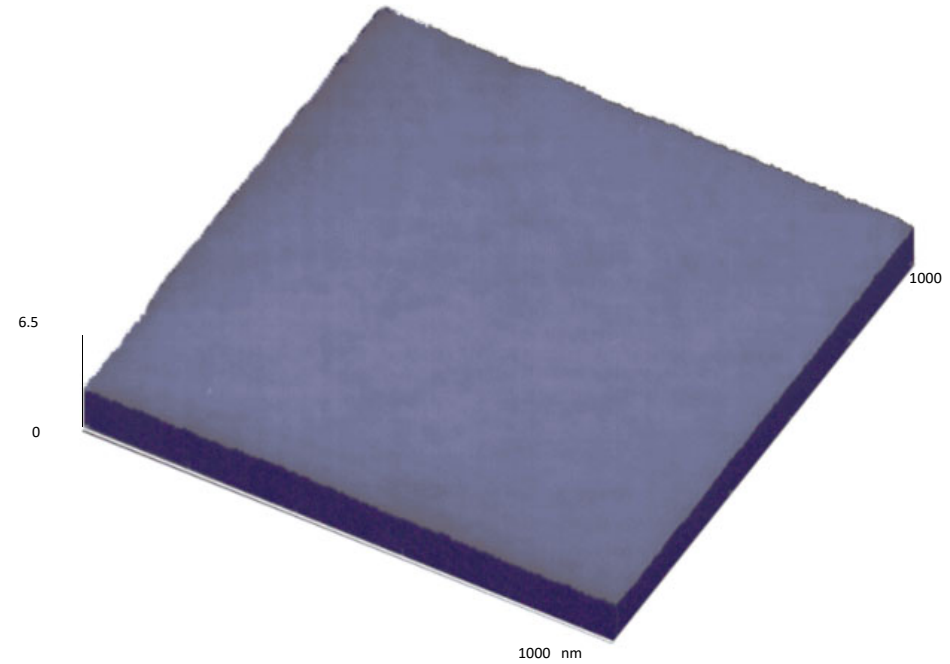
Surface roughness

RF-Sputter- $\text{Al}_2\text{O}_3$



Ra 0.5nm

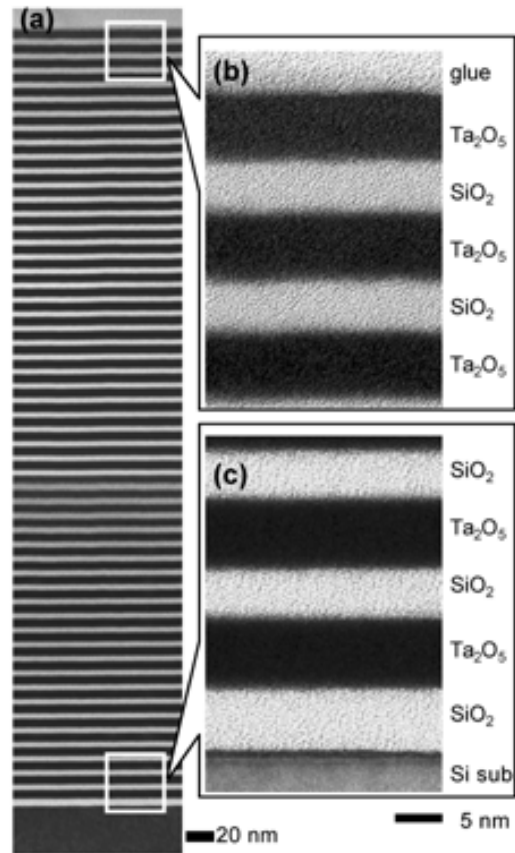
ECR- $\text{Al}_2\text{O}_3$



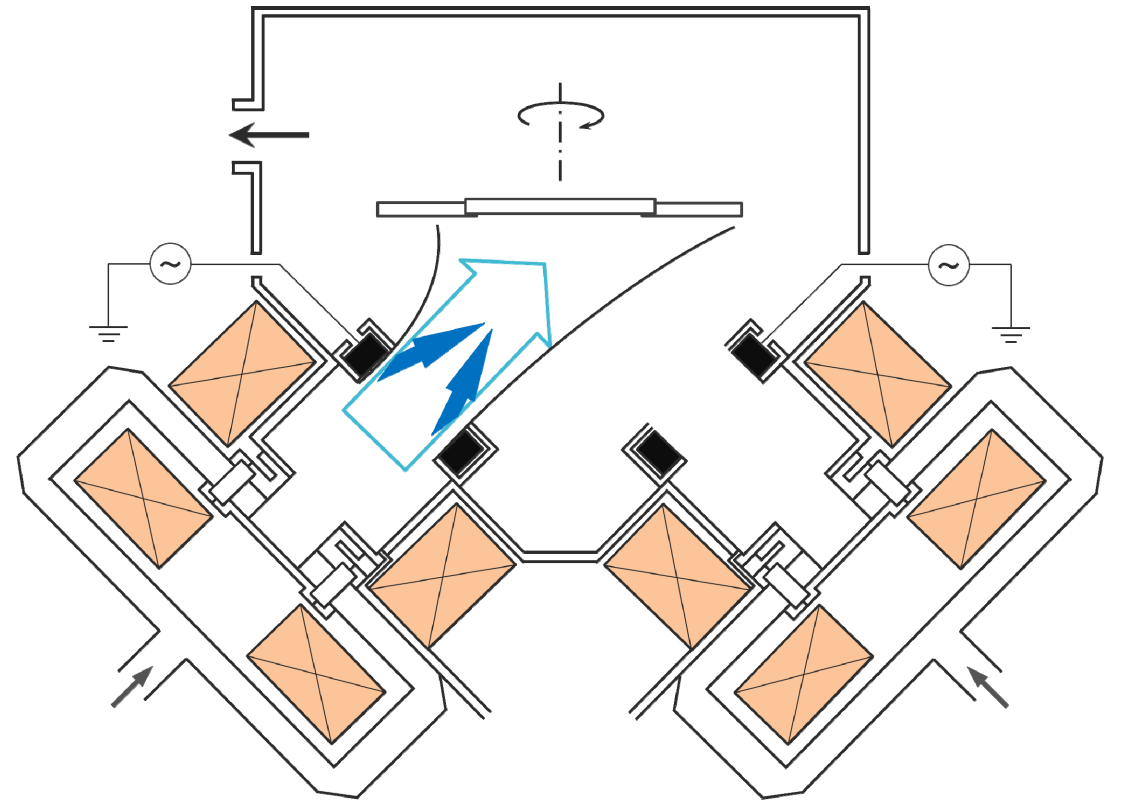
Ra 0.1nm

# 多層膜断面の例

Example of multi-layer film

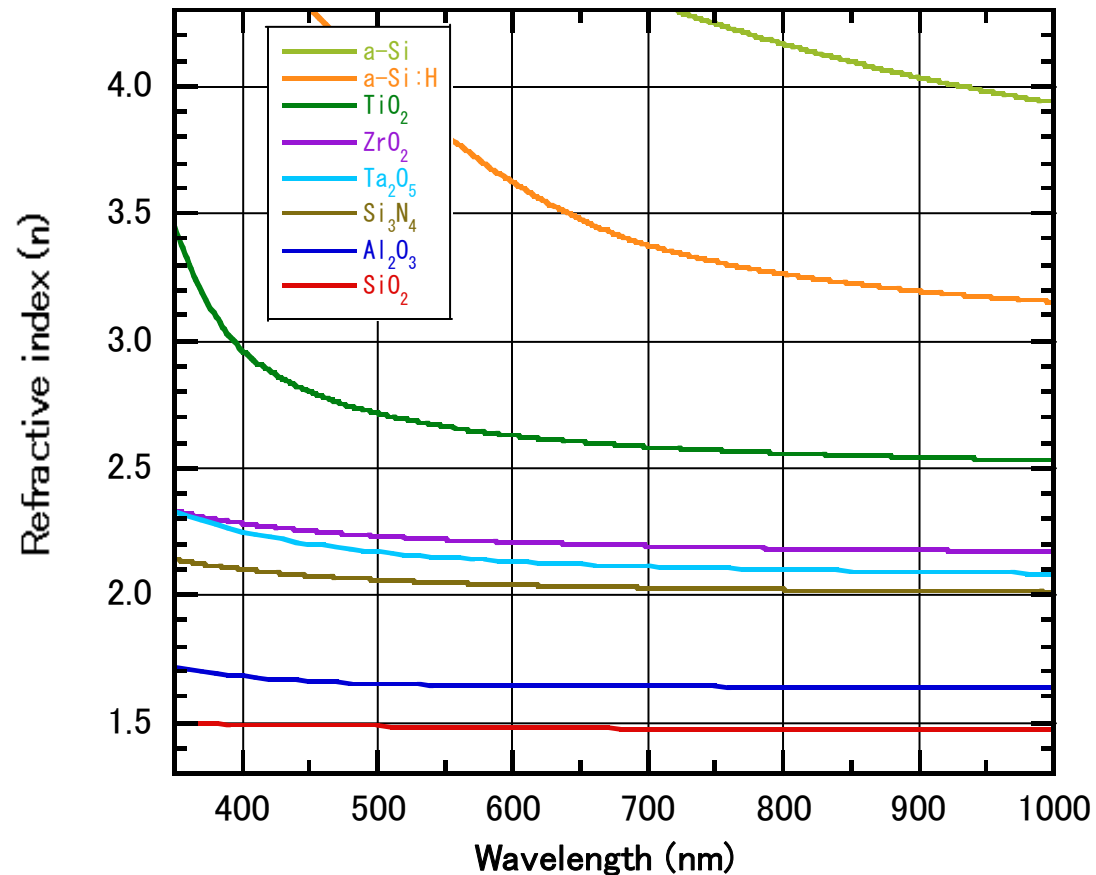


AFTEX-8200



# 各種ECR薄膜の屈折率

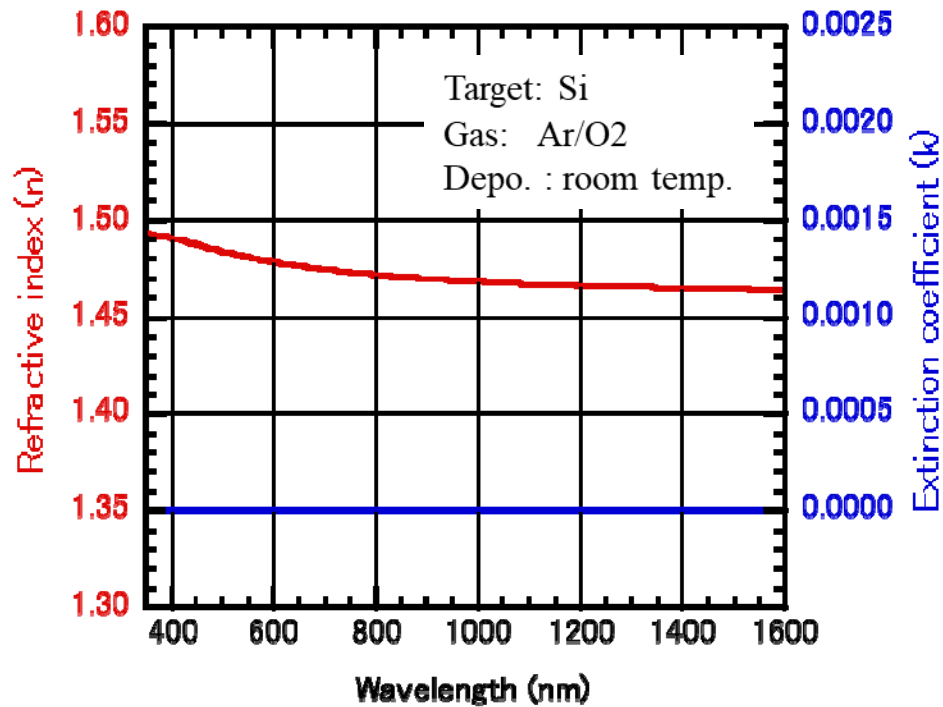
Refractive Index of various films by ECR deposition



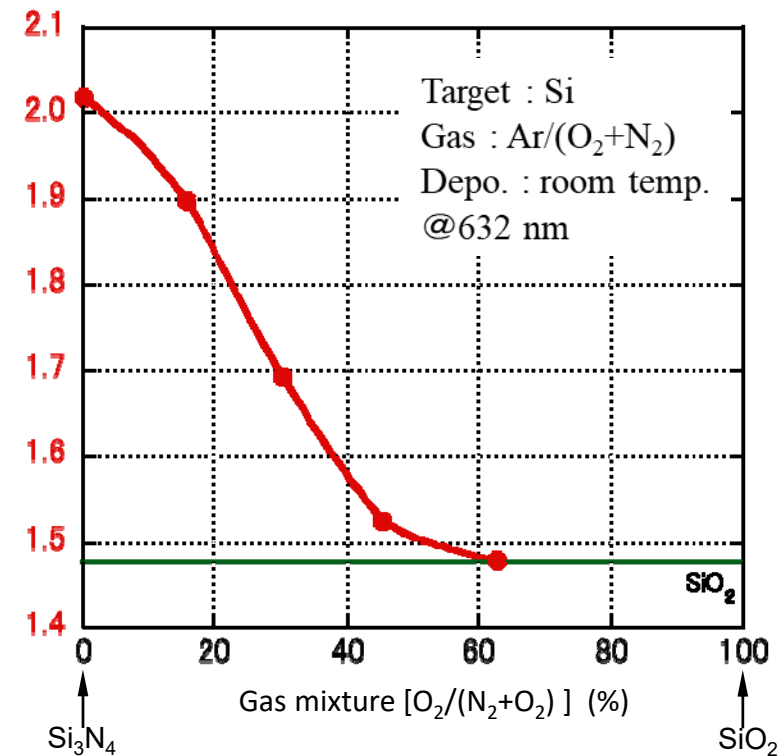
# 光学定数：SiO<sub>2</sub>, SiON

Optical Constants : SiO<sub>2</sub>, SiON

### ECR-SiO<sub>2</sub>



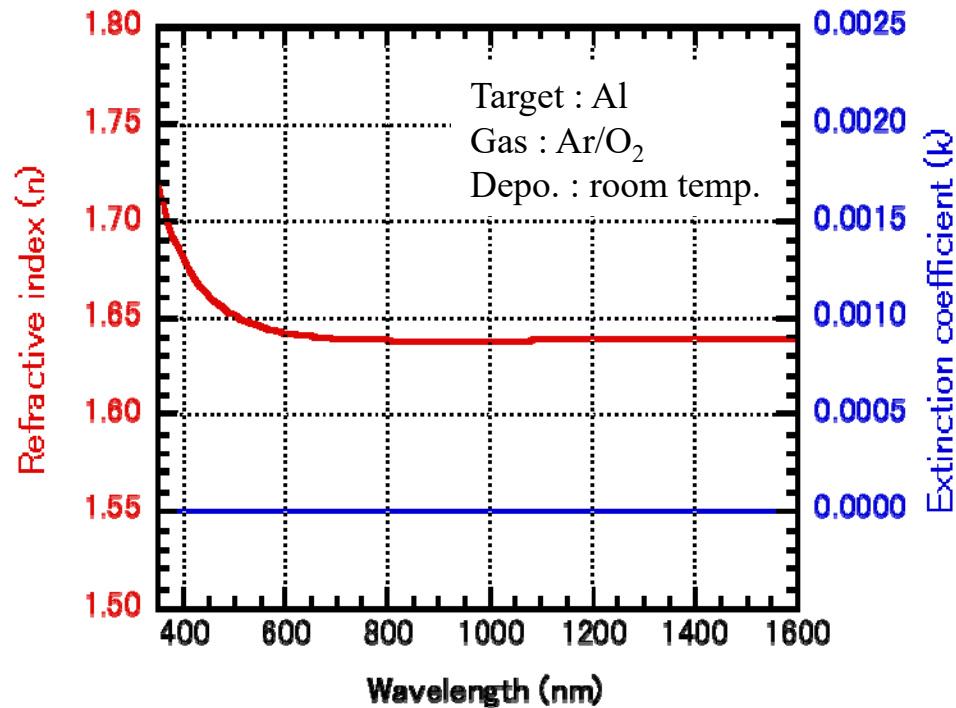
### ECR-SiON



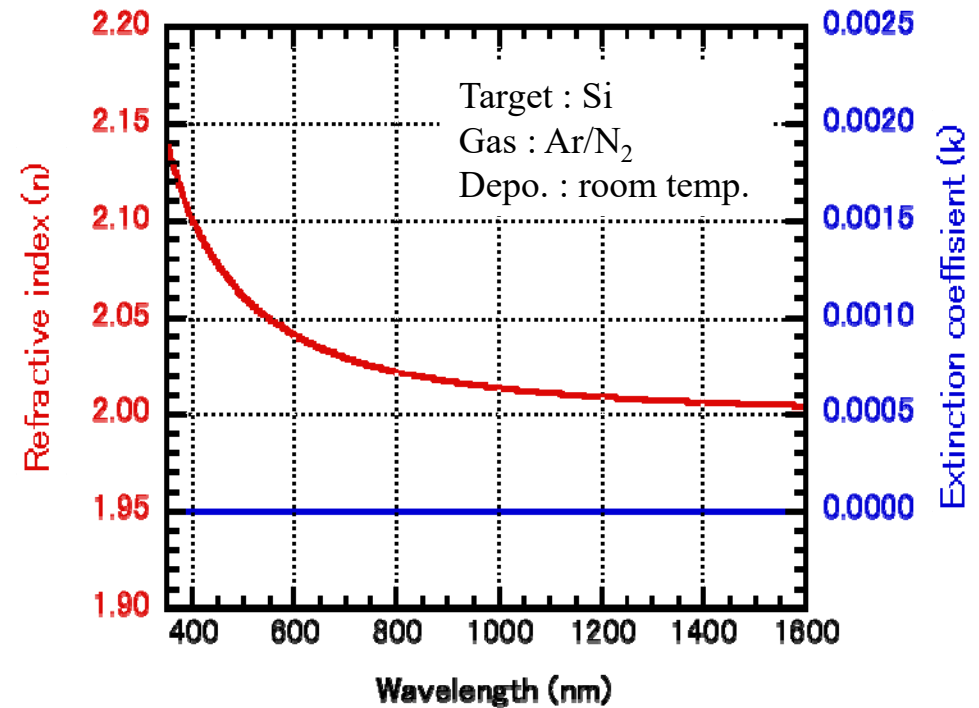
# 光学定数：Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>

Optical Constants : Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub>

ECR-Al<sub>2</sub>O<sub>3</sub>



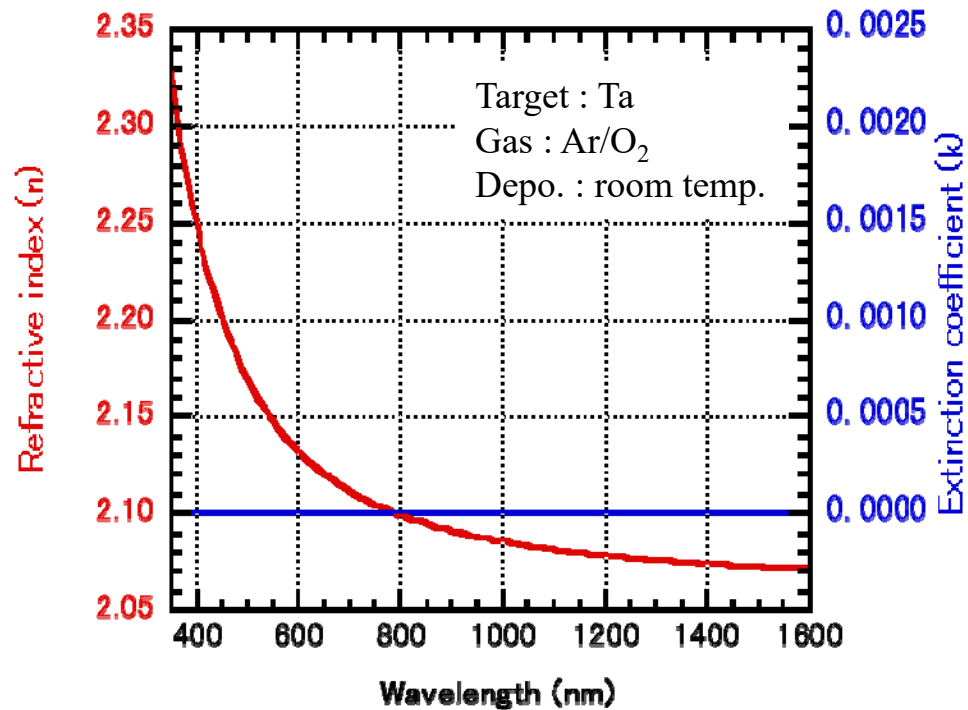
ECR-Si<sub>3</sub>N<sub>4</sub>



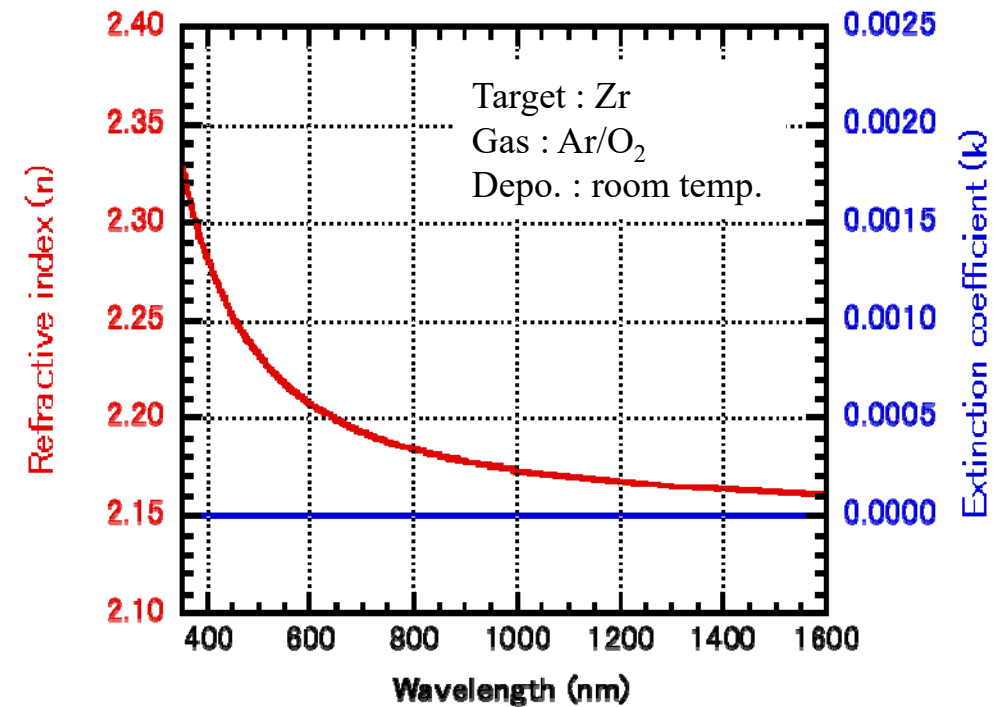
# 光学定数：Ta<sub>2</sub>O<sub>5</sub>, ZrO<sub>2</sub>

Optical Constants : Ta<sub>2</sub>O<sub>5</sub>, ZrO<sub>2</sub>

ECR-Ta<sub>2</sub>O<sub>5</sub>



ECR-ZrO<sub>2</sub>

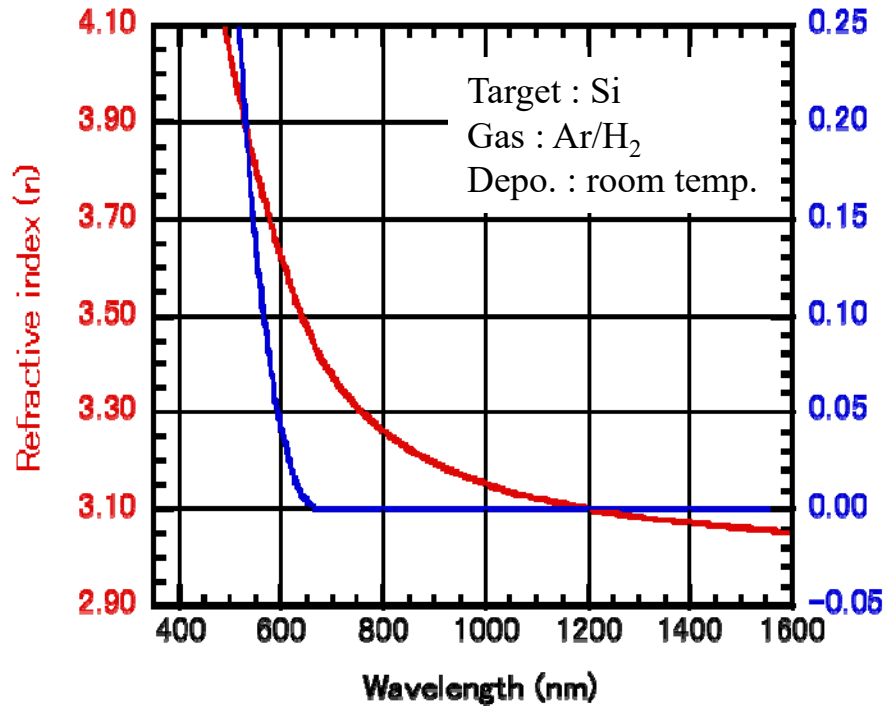




# 光学定数 : a-Si:H, a-Si

Optical Constants : a-Si:H, a-Si

ECR a-Si:H



ECR a-Si

