

# Calipso

Center for surface analytical services

## Expertise center for High Sensitivity Low Energy Ion Scattering (HS-LEIS)

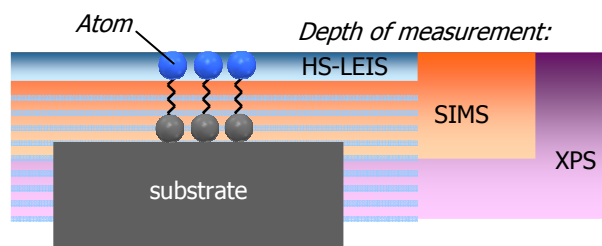
### Activities of Calipso

Calipso provides chemical analysis of the outermost layer of atoms on a material. These measurements are performed with unique HS-LEIS equipment. An understanding of the outermost atomic layer is important since this layer defines the properties of the surface, such as adhesion and wetting properties, and the activity of a catalyst.



A HS-LEIS instrument at Calipso

### HS-LEIS compared to SIMS and XPS:



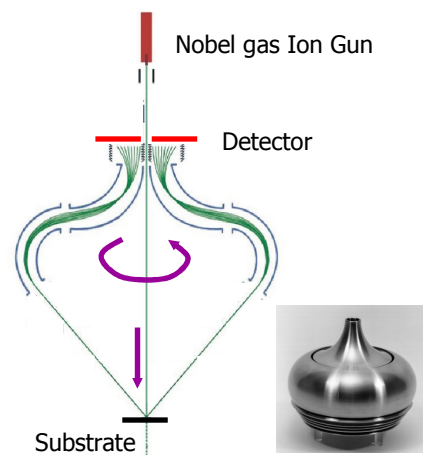
*schematic representation of cross section of surface*

**HS-LEIS** - quantitative 1<sup>st</sup> atomic layer  
- in-depth profile 0-10 nm (shaded area)

**SIMS** - not quantitative (for 1<sup>st</sup> atomic layer)  
- chemical information

**XPS** - information depth of 3 – 10 nm

### Unique HS-LEIS analyzer:



Picture of analyzer

### Unique features of HS-LEIS:

- Quantitative and highly sensitive measurement of outermost atomic surface layer
- Accurate surface analyses on samples with rough surface
- Analysis on non-conductive materials
- Choice of pretreatment and temperature during analysis

### Areas of applications:

- Catalysis
- Coatings
- Diffusion Barriers
- Adhesion
- Corrosion
- Biocompatibility etc.

### Materials:

- Catalysts
- Metals
- Polymers
- Ceramics
- Biomaterials etc.

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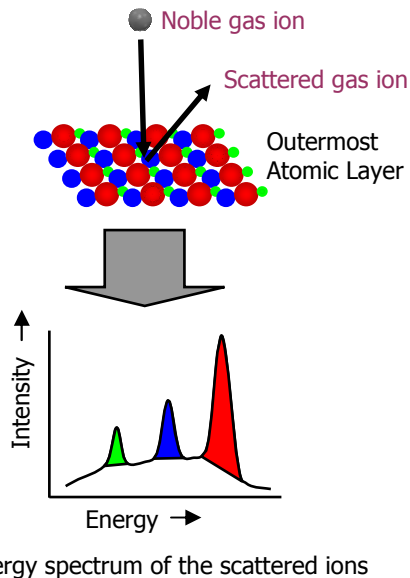
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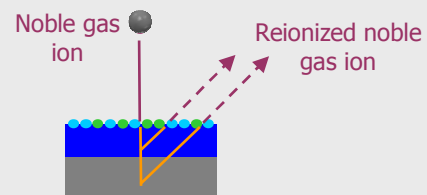
## Types of analyses possible with HS-LEIS

### Measurement of composition

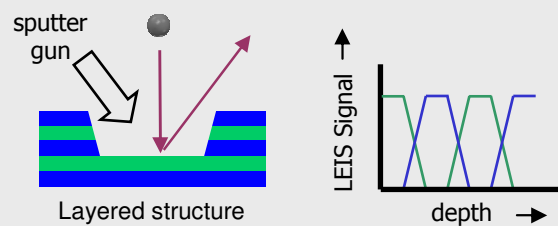


### Measurement of depth profile

#### Non-destructive (0-10 nm)

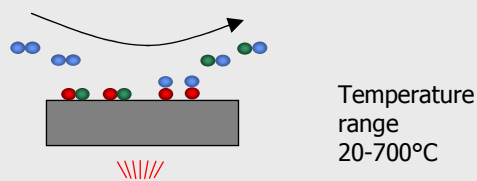


#### Destructive (large depths)

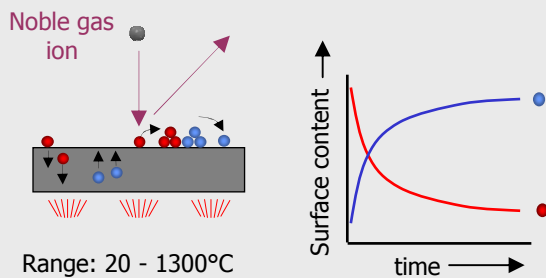


### In-situ treatments

Chemical and/or heat treatment in pre-chamber



Heat treatment in combination with analysis



### Features of HS-LEIS

- Monolayer sensitivity**

Li - O	few % - 1 %
F - Cl	1 % - 0.05 %
K - U	0.05 % - 10 ppm
- Mass separation**

isotopes	$^{16}\text{O} / ^{18}\text{O}$ , $^{63}\text{Cu} / ^{65}\text{Cu}$
elements possible	Al / Si, Ag / Pd
- Ion dose** <math>< 1.10^{13}</math> He ions/cm<sup>2</sup> for polymers
- Lateral resolution** 0.01 - 0.5 mm
- In depth** 0-10 nm