Auger Electron Spectroscopy (AES)

SCIENCE ET SURFACE
Filiale de SERMA TECHNOLOGIES

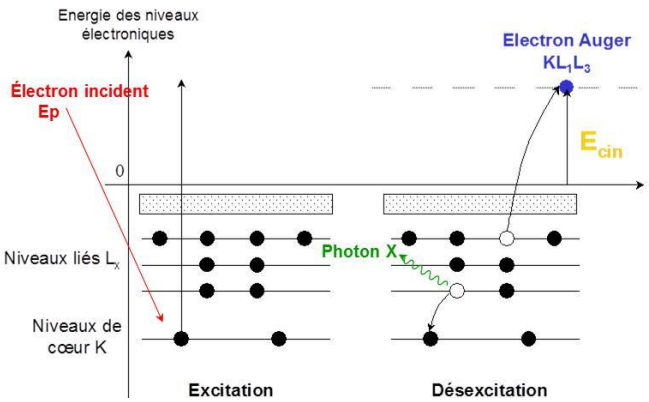
SPECIFICATIONS

- **Qualitative elemental analysis**: all elements are detected, H and He excepted
- Detection limit: 0.1 - 1.0 atomic%
- Surface analysis: analysis depth < 100 Å (about 30 to 50 Å)
- **Chemical information**: type of bonds, oxide/metal rate, ...
- **Semi-quantitative**: accuracy 20 % maximum
- Submicronic imaging with spatial resolution ~ 300 Å (with Field Emission Gun : FEG)
- **Non destructive**... except in concentration profiling (up to a few thousand Å)
- **Conductive samples only**,
- Analysis under **ultrahigh vacuum** (10^{-10} - 10^{-11} torr)

PRINCIPE

Auger electrons are emitted during atom desexcitation by ejection of an electron from the core level. The ionisation can be induced by photo-ionisation, electronic irradiation or by charged particules.

Auger spectroscopy uses a primary electron beam, leading to a very local analysis. This spectroscopic method is closed to XPS spectroscopy (the XPS spectrum obtained by photo-ionisation of the atom core level contains also the spectrum of secondary emission Auger electrons).



The initial state of Auger transition is induced by the ionisation on the atom core level. The desexcitation can be produced in 2 ways :

- Occupation of the vacant orbital by an electron from a higher energy level. This transition induces energy emission through characteristic X-rays.
- In competition with X-ray emission, ejection of another electron (called Auger electron) through the energy liberated from the electron of higher energy level.

Because the inelastic diffusion is in the keV range, only Auger electrons coming from the very top layers can be ejected from the surface. That's why AES is a surface analysis technique.