

Auger Electron Spectroscopy (AES)

What is AES?

Auger Electron Spectroscopy (AES) is an analytical technique that uses a primary electron beam to probe the surface of a solid material. Secondary electrons that are emitted as a result of the Auger process are analyzed and their kinetic energy is determined. The identity and quantity of the elements are determined from the kinetic energy and intensity of the Auger peaks. The nature of the Auger surface analysis process is such that Auger electrons can only escape from the outer 5-50 Å of a solid surface at their characteristic energy. This effect makes AES an extremely surface sensitive technique. A finely focused electron beam can be scanned to create secondary electron and Auger images, or the beam can be positioned to perform microanalysis of specific sample features. Applications include materials characterization, failure analysis, thin film analysis, and particle identification for semiconductor and thin film head manufacturing.

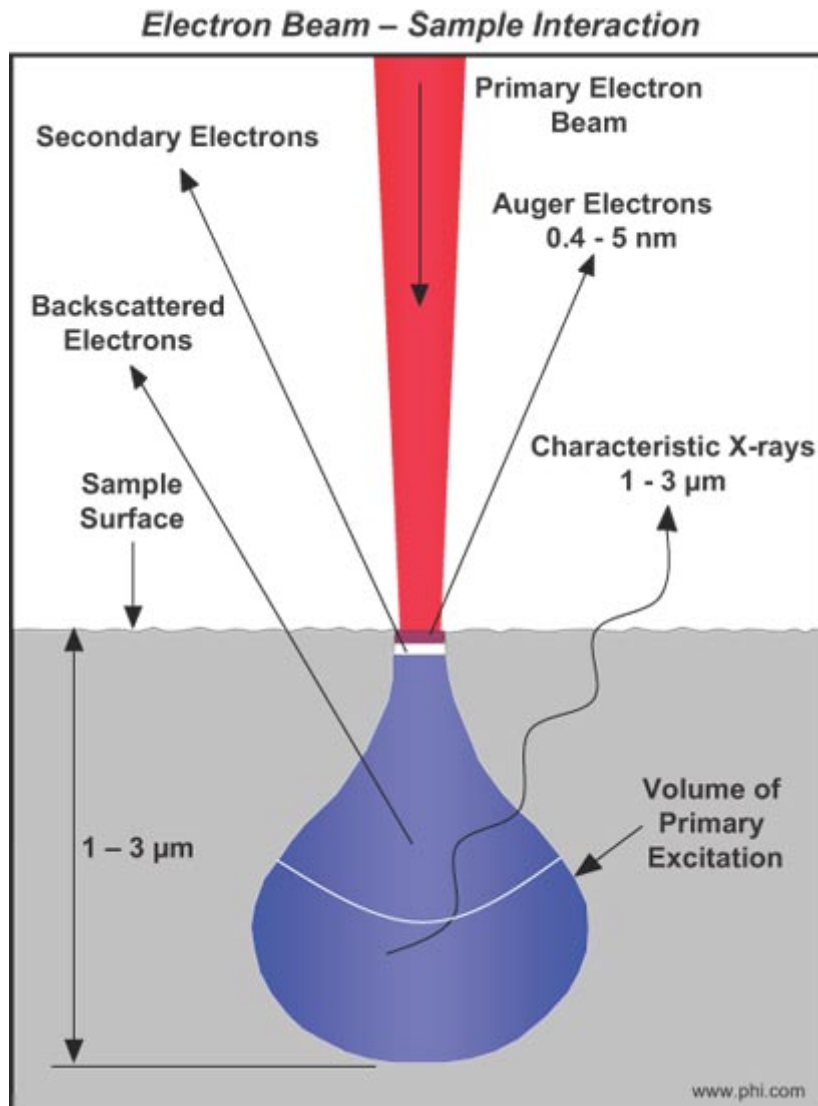


Fig. 1: Comparison of AES and EDX analysis volume



Fig. 2: Pierre Auger, Discoverer of Auger Effect

The Auger Process

The Auger effect is named for its discoverer, Pierre Auger, who observed radiationless relaxation of excited ions in a cloud chamber, during the 1920s. Auger electrons are emitted at discrete energies that allow the atom of origin to be identified. The Auger process involves three steps:

1. Excitation of the atom causing emission of an electron
2. An electron drops down to fill the vacancy created in step 1
3. The energy released in step 2 causes the emission of an Auger electron.

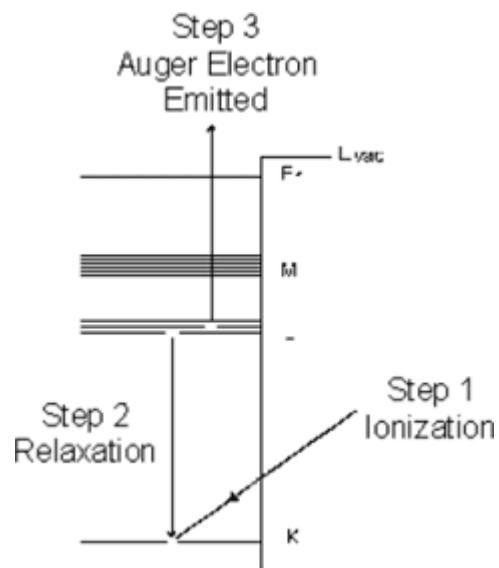


Fig. 3: The Auger process.