

10.3.4.7 Laser atomization and excitation for use in atomic emission spectroscopy

Lasers of high power output, e.g., Q-switched lasers, may be capable of producing atomic vapour at such high temperatures that appreciable atomic radiation is generated, thus acting as a *one-step excitation source* for AES.

10.3.4.7.1 Laser atomization with additional excitation

The laser-produced plume can additionally be excited by a *supplementary source*. In this *two-step procedure*, the radiance of the analysis lines can be increased and the line-to-background intensity ratios can be improved.

If the laser plume is allowed to enter a spark gap across which a medium voltage spark discharge takes place, additional atomization and excitation are possible. This is called *spark cross-excitation*. The spectra produced in this way are essentially those of a medium voltage spark. Triggering of the *auxiliary discharge* may be effected by the laser plume itself or by external means.

10.3.4.7.2 Analytical applications

The possibility of vaporizing material from a pre-determined small area of a sample makes laser atomization suitable for *laser local analysis*. *Microanalysis* is possible if a *microsample* can first be concentrated into a small volume and positioned on to a suitable support in such a way that a *local analysis* can be carried out. Additional excitation is also necessary. *Homogeneous samples* of almost any kind can be analyzed by laser atomization using high power single *laser-shot* operation or alternatively, scanning a part of the sample area by using a number of laser shots, of lower energy and power, may form the basis of *scanning laser analysis*.