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Spatially and temporally resolved detection of analytical signals in graphite furnace atomic absorption spectrometry

Gilmutdinov A., Radziuk B., Sperling M., Welz B.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Spatial non-uniformities in analyte, atomizer gas phase temperature and radiant intensity distributions characteristic for graphite furnace atomic absorption spectrometry are briefly summarized and their effect on the analyte detection is analysed. It is shown that conventional detection of analyte based on the use of photomultiplier tubes provides excellent temporal resolution, sufficient wavelength isolation but totally ignores the spatial aspects of the interaction of the probing radiation beam with the analyte in the atomizer. A new, spatially resolved, method of analyte detection based on the use of a solid state detector located along the monochromator slit is presented. The approach is illustrated by the temporally and spatially resolved detection of Cd atomization and NaCl vaporization. It is shown that severe non-uniformities in atomic and/or background absorbance may be a potential source of analytical error. Advantages of spatially resolved detection as compared with conventional detection are discussed.

Keywords

Atomic absorption spectrometry, Cd atomization, Detection system, NaCl vaporization, Photodiode array, Spatial resolution