

Overview of Measurement Technologies for Air Pollutants and Air Quality Metrics

Pollutant Type:

Particulate Matter

Pollutant/Metric Name:

Non-Carbonaceous Elemental Composition

Automated monitors for metallic elemental composition of ambient particles have been developed only recently; the only commercial instrument available is based on X-ray fluorescence thus adopting one of the reference measurement technologies. Laser-based methods still are in research applications but are very promising in view of future applications for urban air quality monitoring.

#	Technology	Characteristics and Performance	Availability and current use of instruments	Suggested area of application
1	X-ray fluorescence spectroscopy (XRF)	Stand-alone field instrument; Quasi-continuous method (Filter tape exposed for predefined periods); Time resolution between 15 minutes and 4 hours; 23 elements implemented; Minimum detection limit at 4 hours sampling in lower pg/m^3 range for most elements	Commercial; Explorative field tests in the US, China and New Zealand	Rural; Urban; Industrial
2	Laser-induced breakdown spectroscopy (LIBS)	Uses laser generated plasma for atomic emission measurement; Near real time measurements possible; Detection limits in lower ng/m^3 range have been demonstrated; Improvement for ultra fine particles by use of aerodynamic lens inlets and pre-concentration on a target	Research instruments only	(Rural) Urban; Polluted
3	Spark-induced breakdown spectroscopy (SIBS)	Similar to method 2, but electric spark for plasma generation; Spark generation simpler and cheaper; Detection limits still too high for ambient air; Application for bio-aerosol detection possible	Research instruments only	Emission (stacks)

Author(s):	Ulrich Quass Thomas Kuhlbusch	IUTA, Germany
Co-author(s)		
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