Electronic Supplementary Material (ESI) for Analyst.


# Supplementary Information

## Towards universal ambient ionization: direct elemental analysis of solid substrates using microwave plasma ionization

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**Figure S-1.** Mass spectrum of a lead fishing sinker acquired with the ambient microwave plasma source.

**Figure S-2.** Mass spectrum of a piece of solid copper sulphate acquired with the ambient microwave plasma source (a) and the theoretical isotopic distribution for copper (b).

**Figure S-3.** Mass spectrum of silver-bearing solder acquired with the ambient microwave plasma source (a) and theoretical isotopic distributions for silver (b) and tin hydroxide (c). The inset is an expansion of the tin hydroxide cluster peaks for comparison with the theoretical isotopic distribution.

**Figure S-4.** Mass spectrum of a Aluminium 6061 alloy acquired with the ambient microwave plasma source.

**Figure S-5.** Mass spectrum of a cobalt powder sampled with the open end of a melting point capillary (a) and sampled with a filter paper swab (b).

**Figure S-6.** Mass spectrum of strontium titanate acquired with the ambient microwave plasma source (a) and the theoretical isotopic distribution for strontium and strontium hydroxide (b).

**Figure S-7.** Mass spectrum of ferrous sulphate acquired with the ambient microwave plasma source (a) and the theoretical isotopic distribution for iron (b).

**Figure S-8.** Ambient microwave plasma ionization mass spectra for 10 µg of elemental standard solutions for cobalt chloride (a), caesium (b), barium (c), and lead (d) deposited onto filter paper and held in the plasma (e), with minimal damage to the substrate (f).

**Figure S-9.** Ambient microwave plasma ionization mass spectra for 100 ng of methyl centralite (a) and 1 µg of RDX (b) deposited onto metal mesh and held in the plasma, without the use of source fragmentation on the ion trap

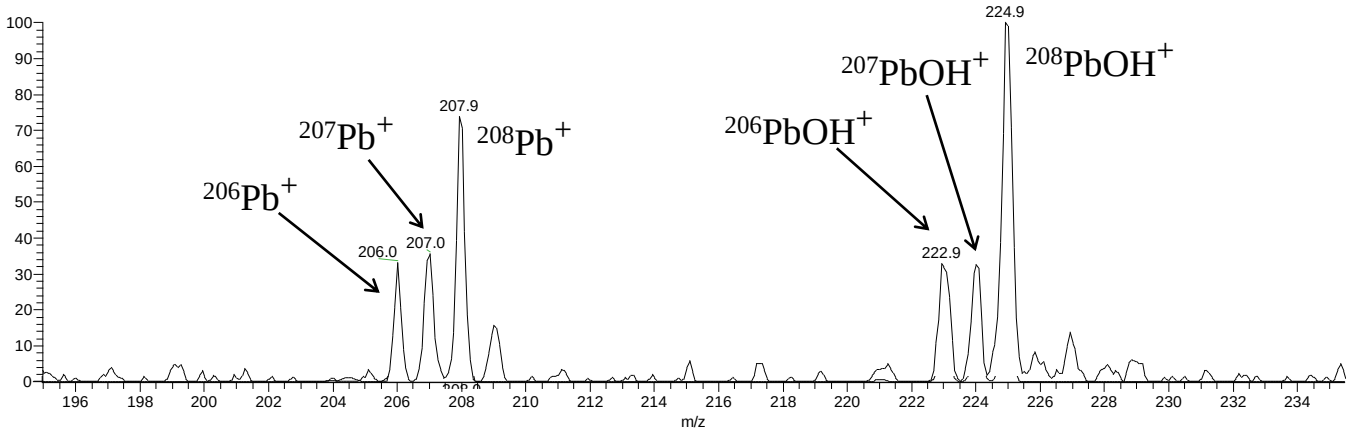



**Figure S-1.** Mass spectrum of a lead fishing sinker acquired with the ambient microwave plasma source.

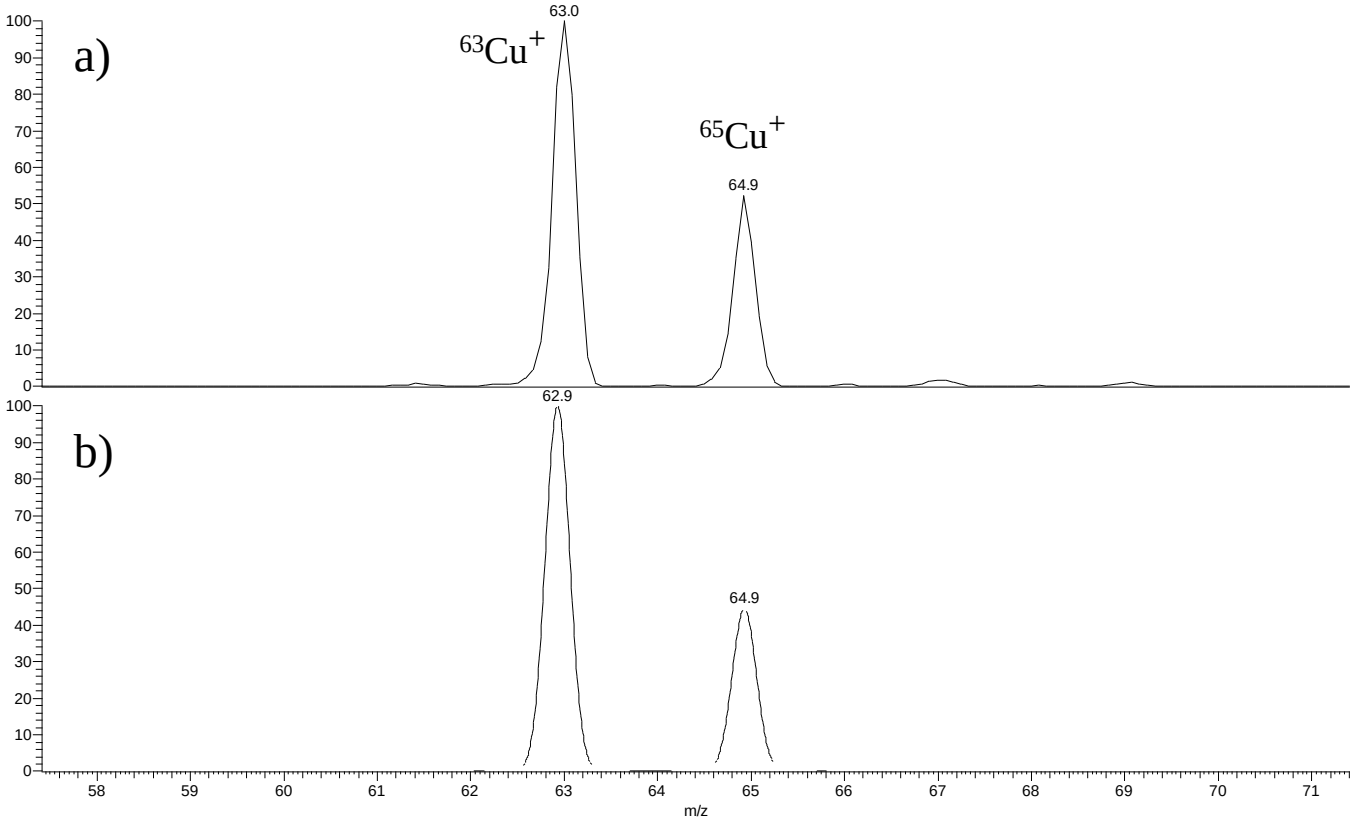



**Figure S-2.** Mass spectrum of a piece of solid copper sulphate acquired with the ambient microwave plasma source (a) and the theoretical isotopic distribution for copper (b).

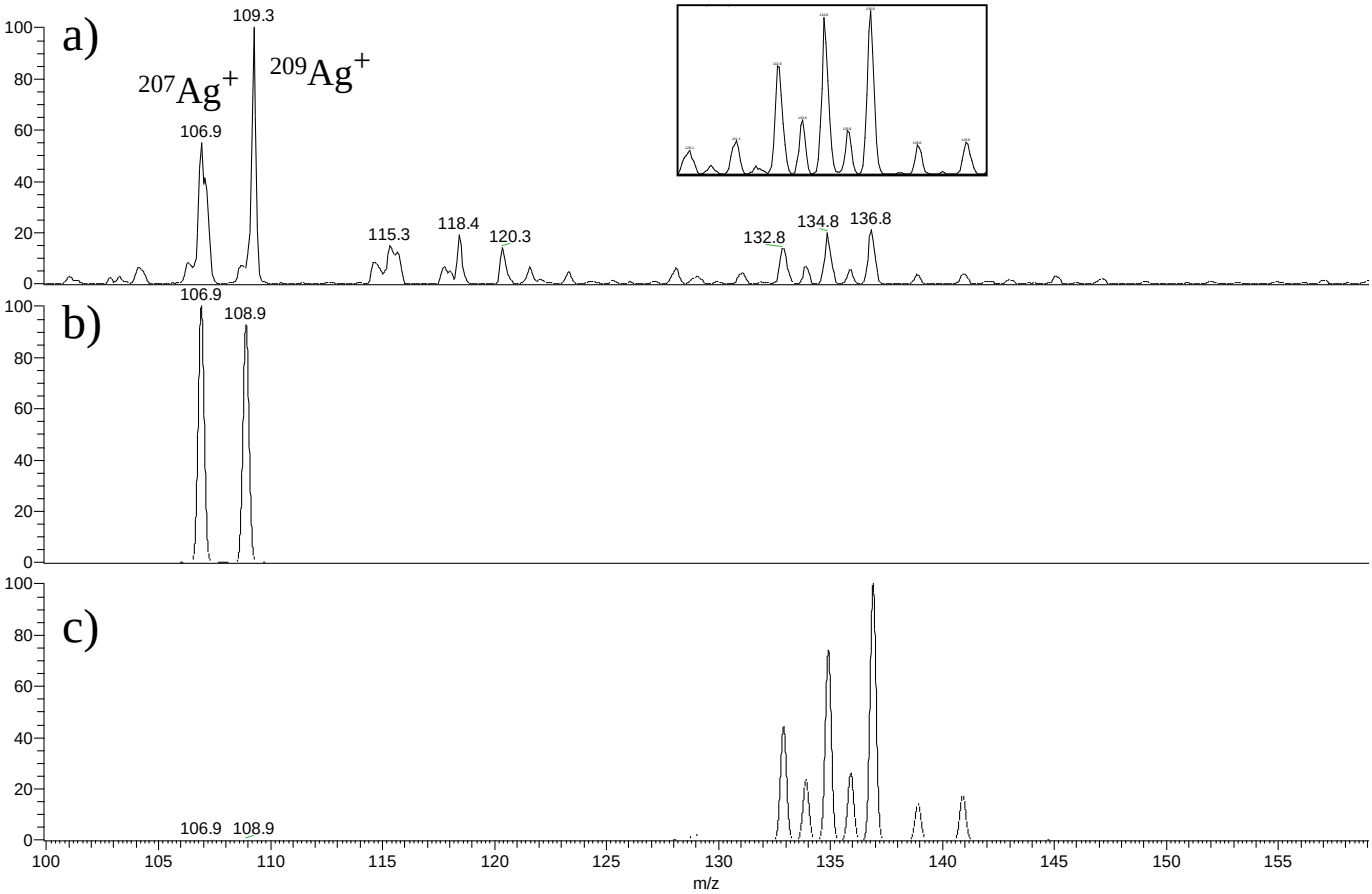



**Figure S-3.** Mass spectrum of silver-bearing solder acquired with the ambient microwave plasma source (a) and theoretical isotopic distributions for silver (b) and tin hydroxide (c). The inset is an expansion of the tin hydroxide cluster peaks for comparison with the theoretical isotopic distribution.

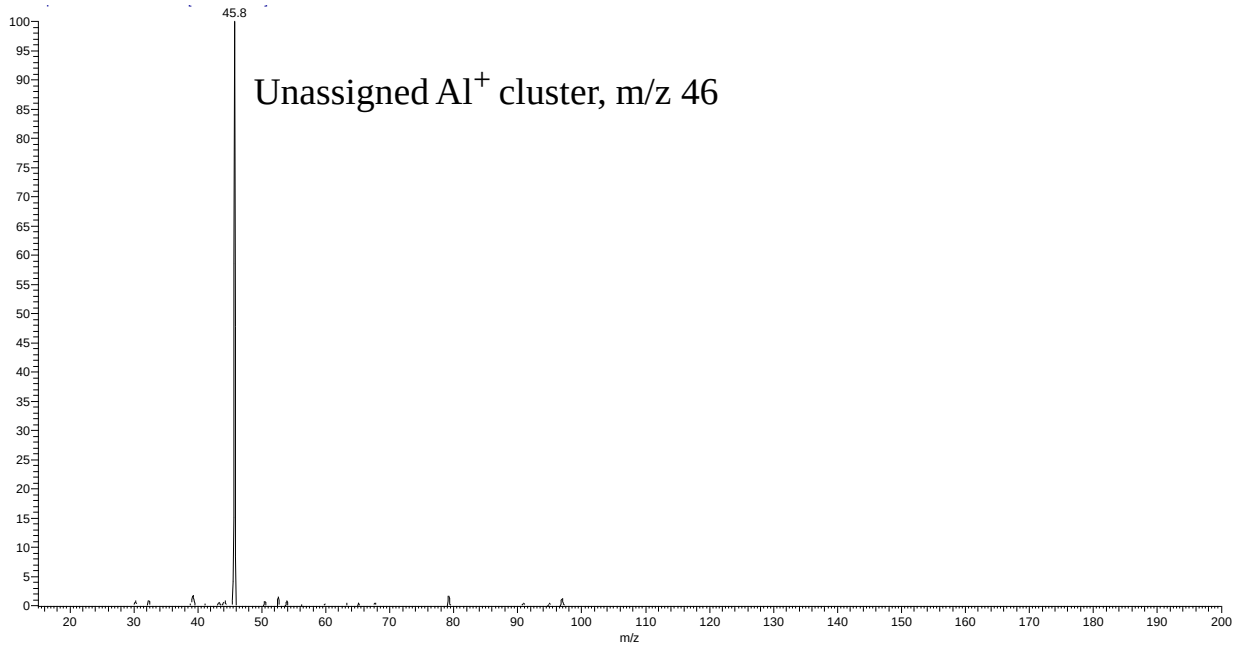



**Figure S-4.** Mass spectrum of a Aluminium 6061 alloy acquired with the ambient microwave plasma source.

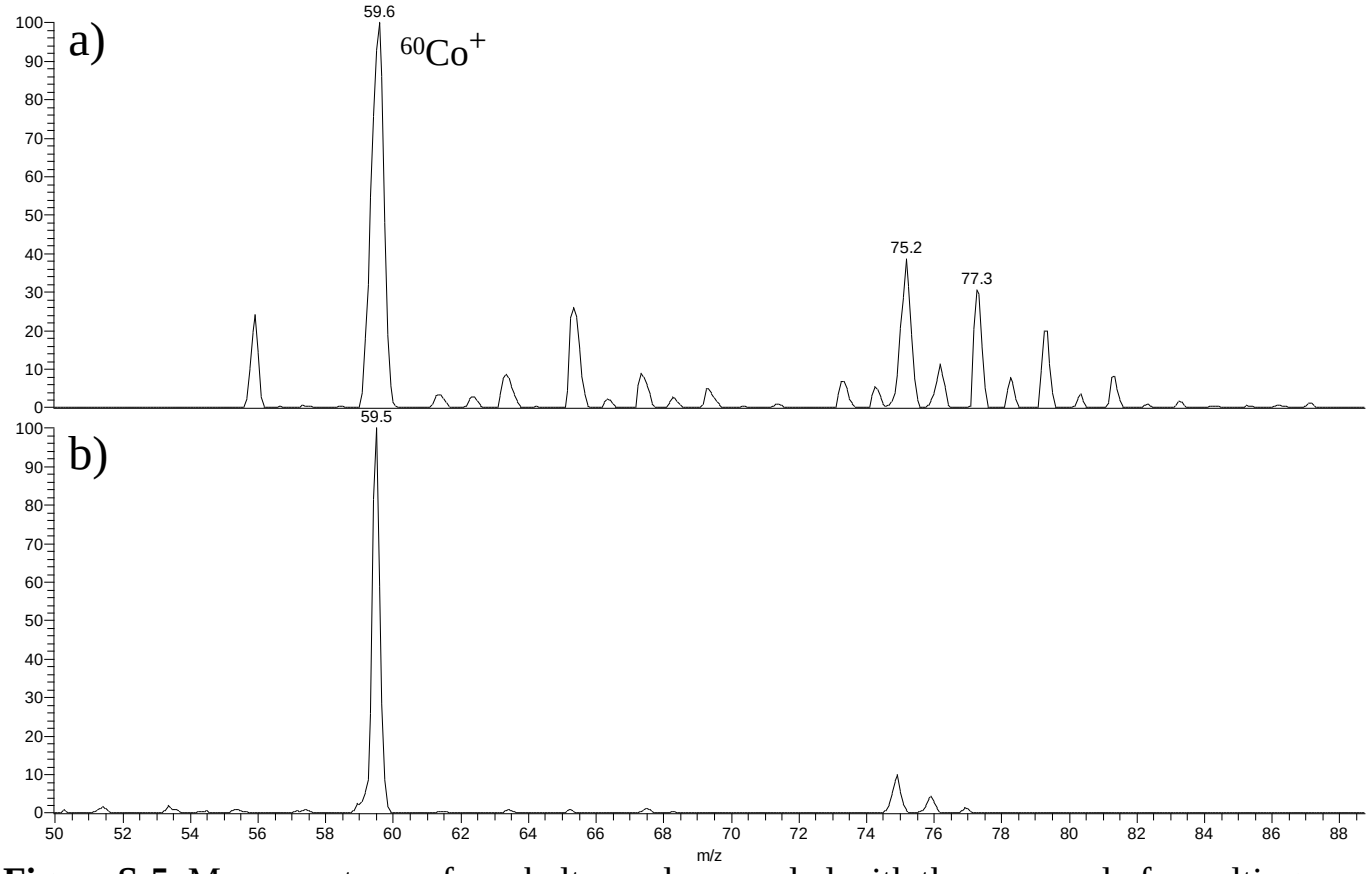



**Figure S-5.** Mass spectrum of a cobalt powder sampled with the open end of a melting point capillary (a) and sampled with a filter paper swab (b).

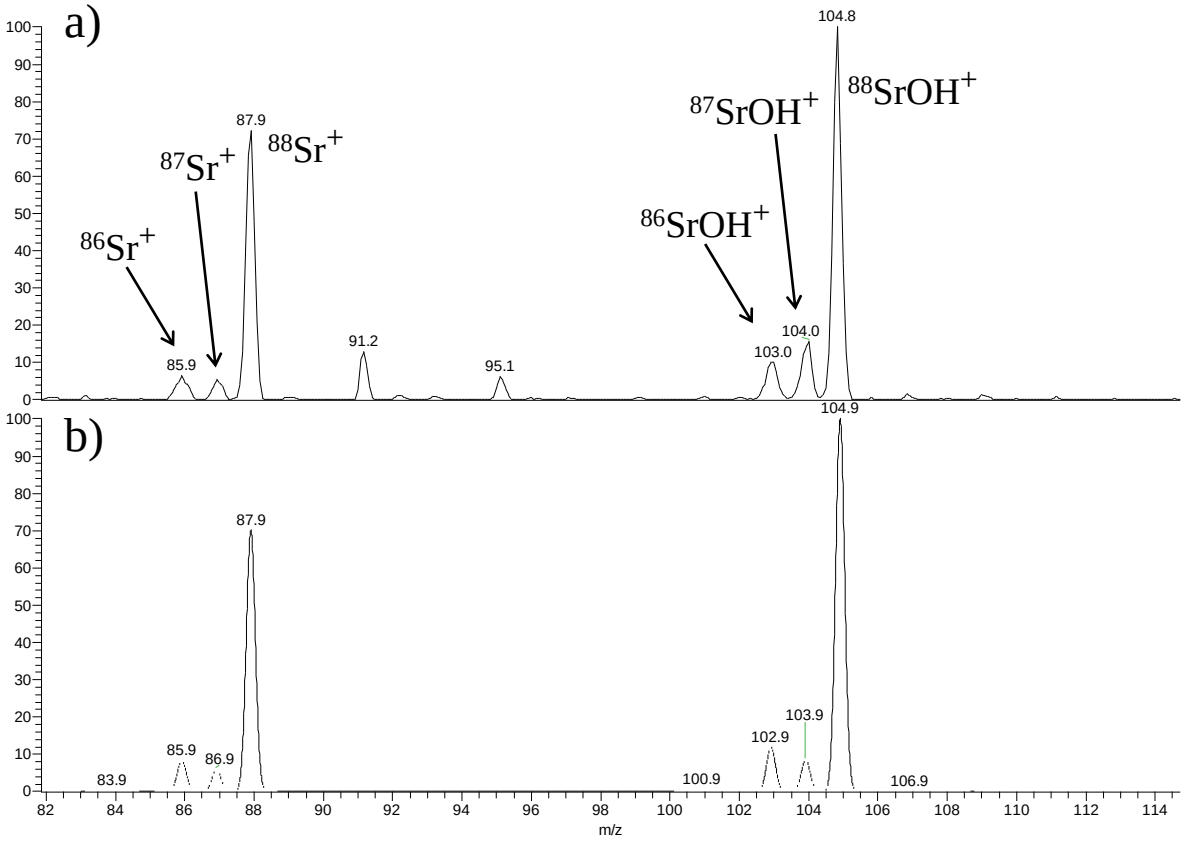



**Figure S-6.** Mass spectrum of strontium titanate acquired with the ambient microwave plasma source (a) and the theoretical isotopic distribution for strontium and strontium

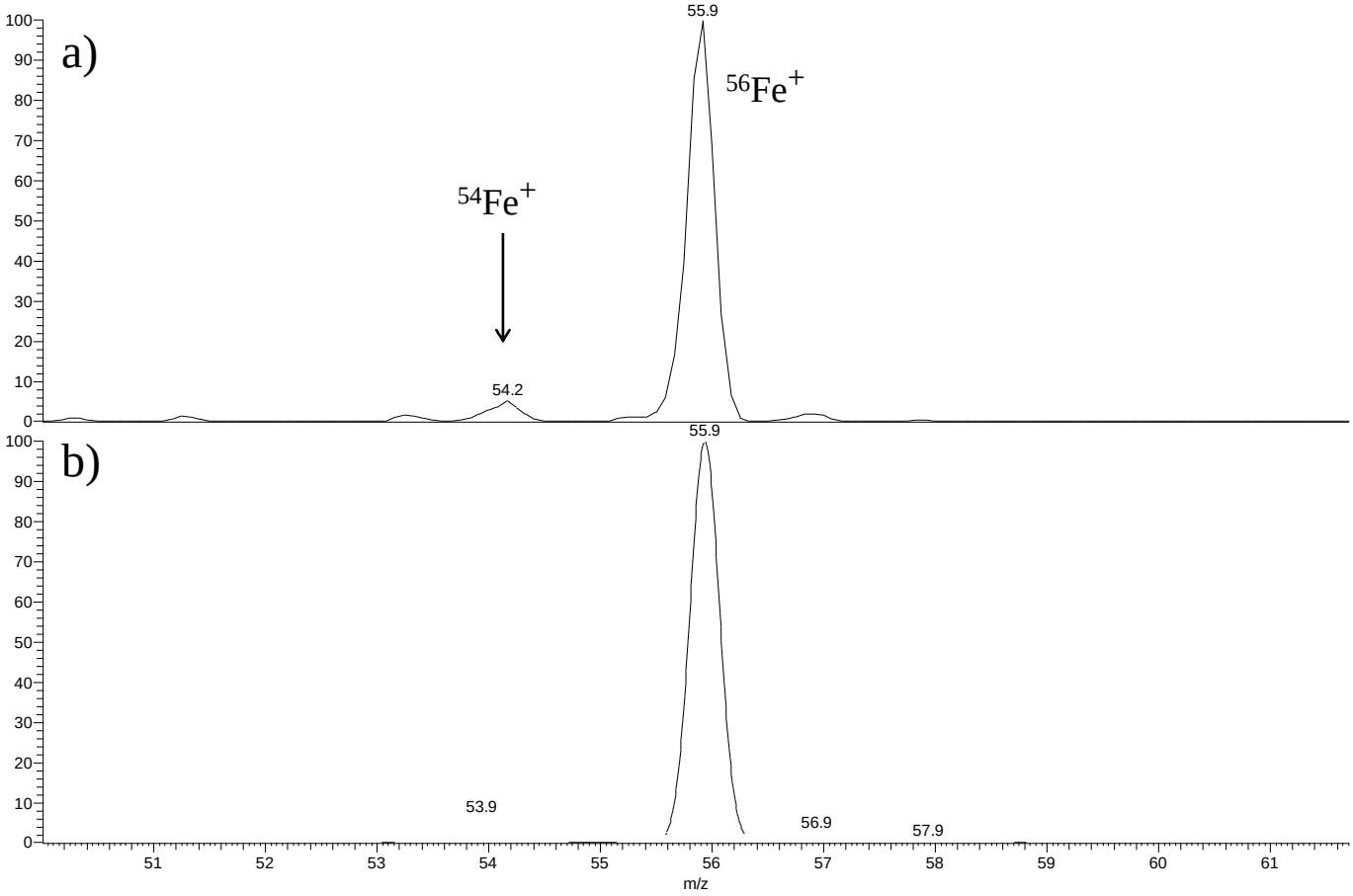
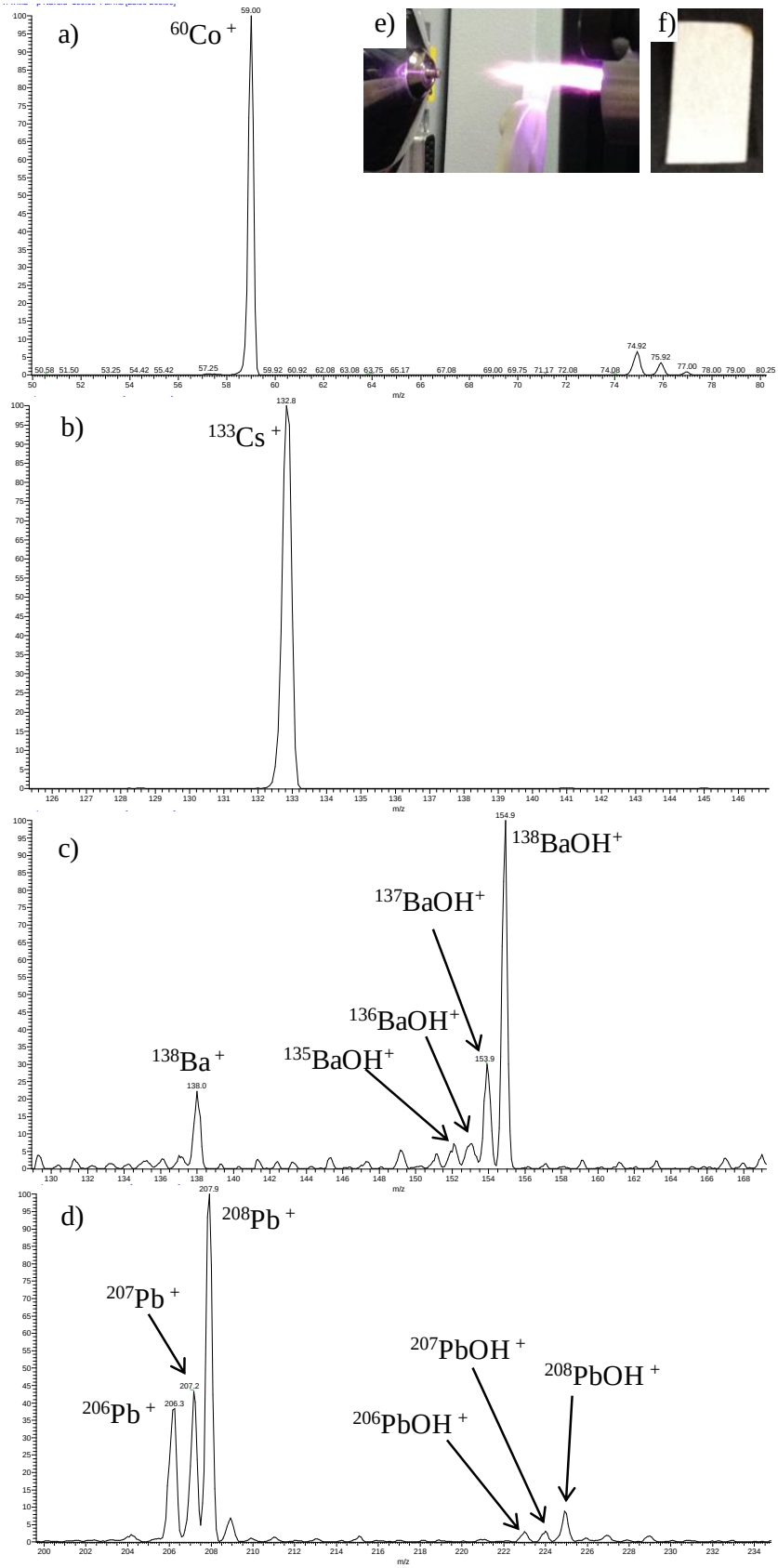



**Figure S-7.** Mass spectrum of ferrous sulphate acquired with the ambient microwave plasma source (a) and the theoretical isotopic distribution for iron (b).

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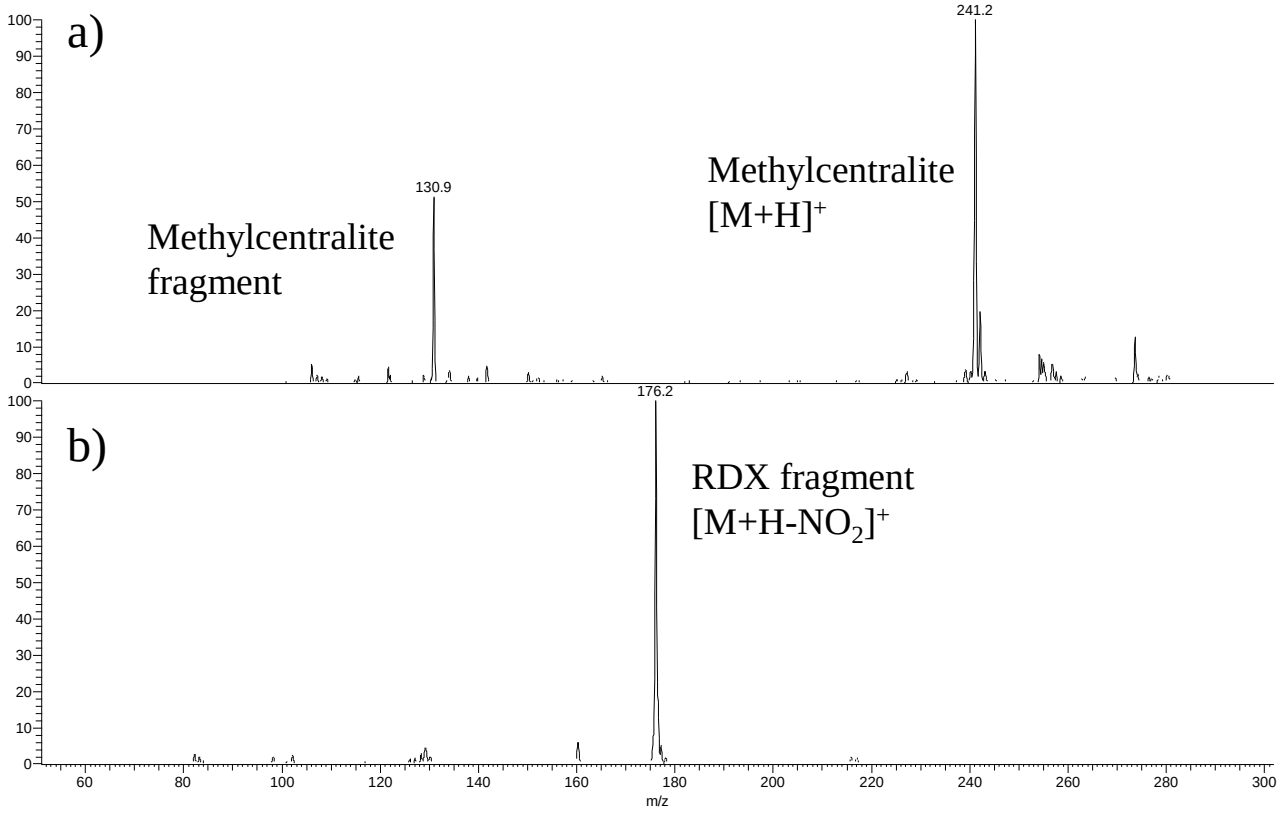


**Figure S-9.** Ambient microwave plasma ionization mass spectra for 100 ng of methyl centralite (a) and 1 µg of RDX (b) deposited onto metal mesh and held in the plasma, without the use of source fragmentation on the ion trap.