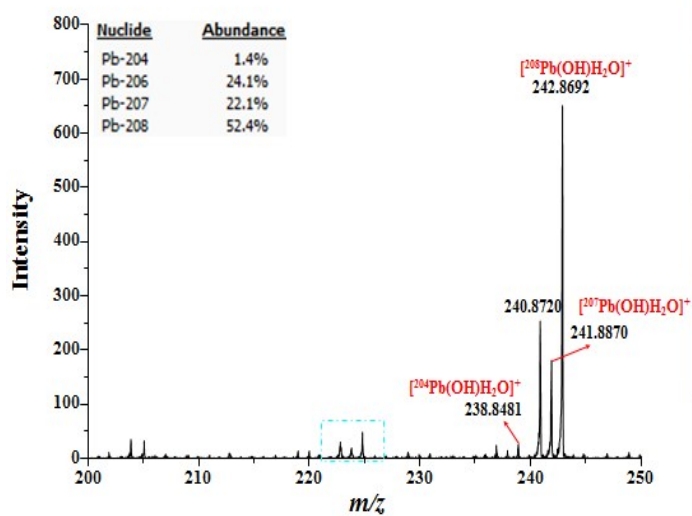


1 Supporting Materials

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3 The study interpreted the m/z 36 as $[\text{H}_2\text{O-H-OH}]^+$, and the literatures had been
4 reported that microwave plasma torch (MPT) sources produced little or no ammonium
5 ions. Some literatures proved $[\text{H}_2\text{O-H-OH}]^+$, such as [34]-[37] in main text. Moreover,
6 we employed an auxiliary experiment, with experimental conditions keeping almost
7 the same as the original experiment, including microwave power being 150W and
8 discharge gas flow rate such as support gas being 600 mL/min and carrier gas being
9 900 mL/min. In this auxiliary experiment, an aerosol produced by lead standard
10 solution ($10\mu\text{g}\cdot\text{L}^{-1}$) flowed across the plasma flame through the central cube of the
11 MPT ion source, and were analyzed by a Time-of-Flight mass spectrometer (API-
12 TOF MS 5000; Guangzhou Hexin Co., Ltd.) under positive ion detection mode. The
13 generated adduct ions of lead were detected and identified, and the software of
14 Molecular Weight Calculator was employed to analyze the exact molecular formulas.

15 The simulation result by the software of Molecular Weight Calculator showed
16 that the ionic formula of m/z 242.8692 should be $[\text{}^{208}\text{Pb}(\text{OH})\text{H}_2\text{O}]^+$ but not
17 $[\text{}^{208}\text{Pb}(\text{OH})\text{NH}_4]^+$ based on the natural isotope distribution of these elements,
18 illustrating in Figure S1. The auxiliary result certified indirectly that was the hydrated
19 ion, but not NH_4^+ , which was dominant in the air-opened Ar-MPT plasma. Based on
20 this result, we deduced the ions of m/z 36 should be $[\text{H}_2\text{O-H-OH}]^+$ but not any else.



Formula: PbOH ₂ O			
Mass	Fraction	Intensity	
238.98632	0.0139258	2.67	
239.98632	0.0000169	0.00	
240.98632	0.2397795	45.89	
241.98632	0.2201188	42.13	
242.98632	0.5224736	100.00	
243.98632	0.0015361	0.29	
244.98632	0.0021443	0.41	
245.98632	0.0000027	0.00	
246.98632	0.0000022	0.00	

Formula: PbOHNH ₄			
Mass	Fraction	Intensity	
239.01013	0.0139042	2.66	
240.01013	0.0000671	0.01	
241.01013	0.2393786	45.86	
242.01013	0.2206418	42.27	
243.01013	0.5219643	100.00	
244.01013	0.0029650	0.57	
245.01013	0.0010738	0.21	
246.01013	0.0000048	0.00	

Formula: PbNH ₃ H ₂ O			
Mass	Fraction	Intensity	
239.01013	0.0139042	2.66	
240.01013	0.0000671	0.01	
241.01013	0.2393786	45.86	
242.01013	0.2206418	42.27	
243.01013	0.5219643	100.00	
244.01013	0.0029650	0.57	
245.01013	0.0010738	0.21	
246.01013	0.0000048	0.00	

Figure S1. Detection of the lead ions in aqueous by MPT-MS.

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