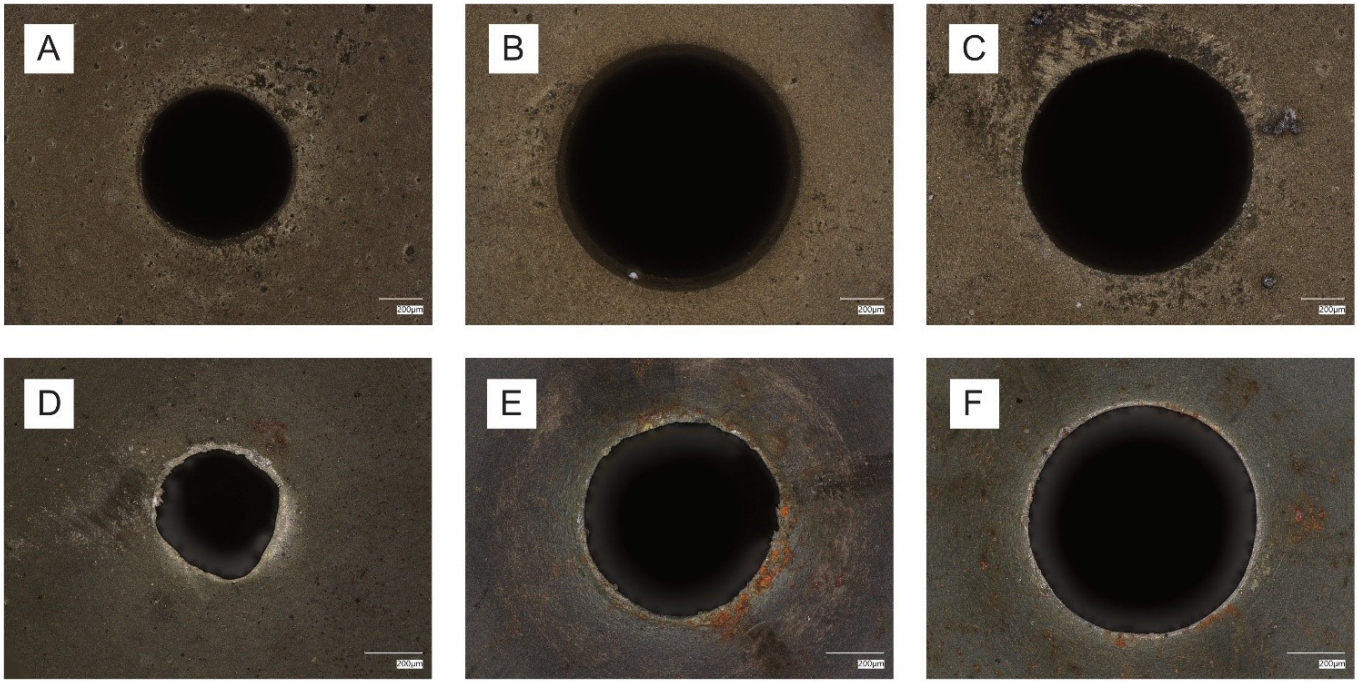
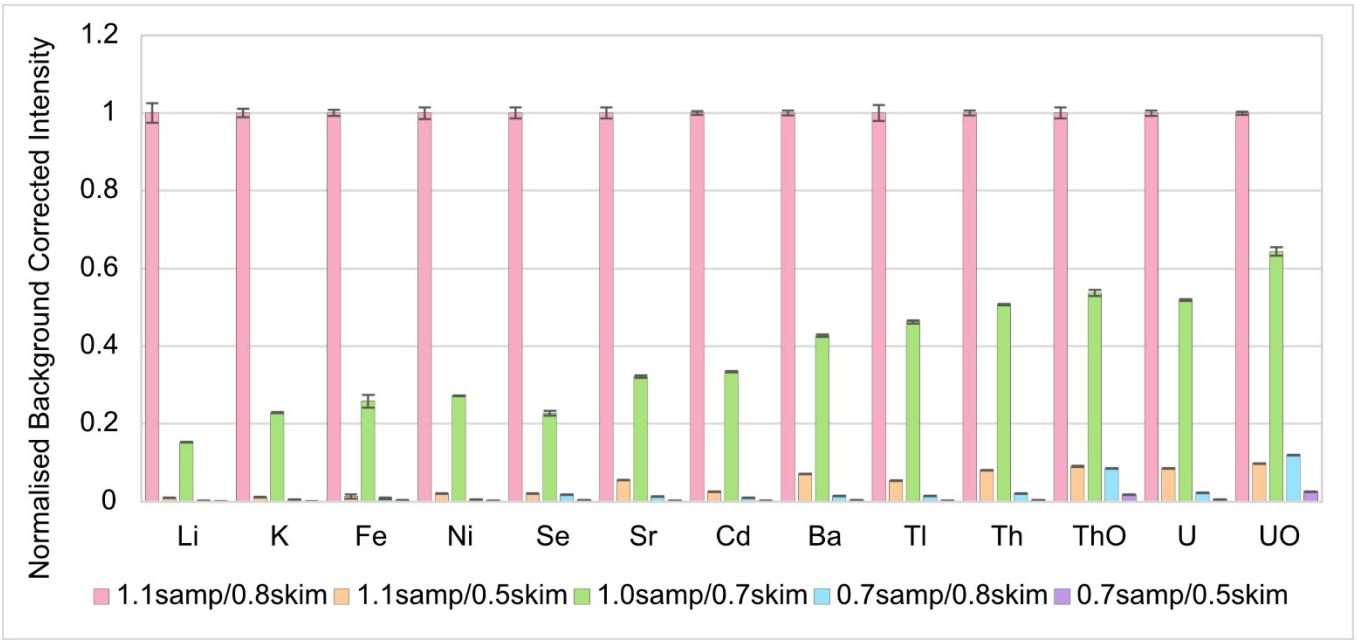
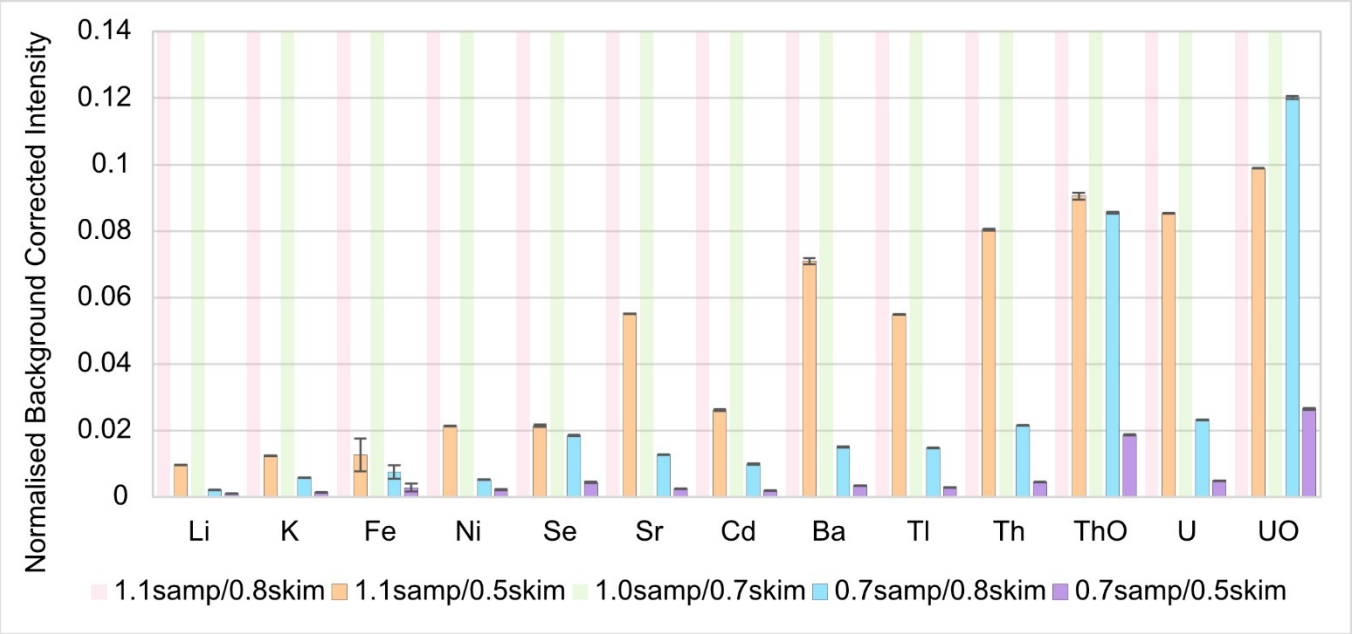
Supplementary Information



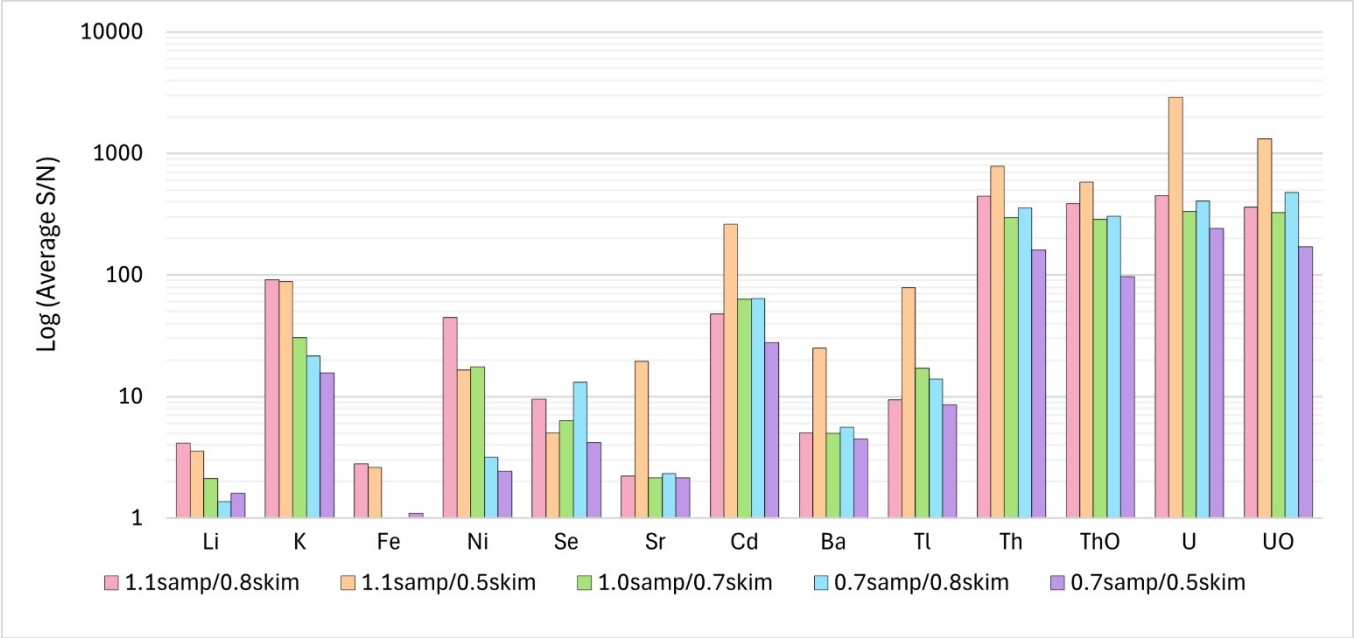
Supplementary Figure S1. Digital microscope images of sampler cones (A-C) with orifices of 0.7, 1.0 and 1.1 mm, respectively, and skimmer cones (D-F) with orifices of 0.5, 0.7 and 0.8 mm, respectively, after ~10 days operation. Scale bar represents 200 µm.



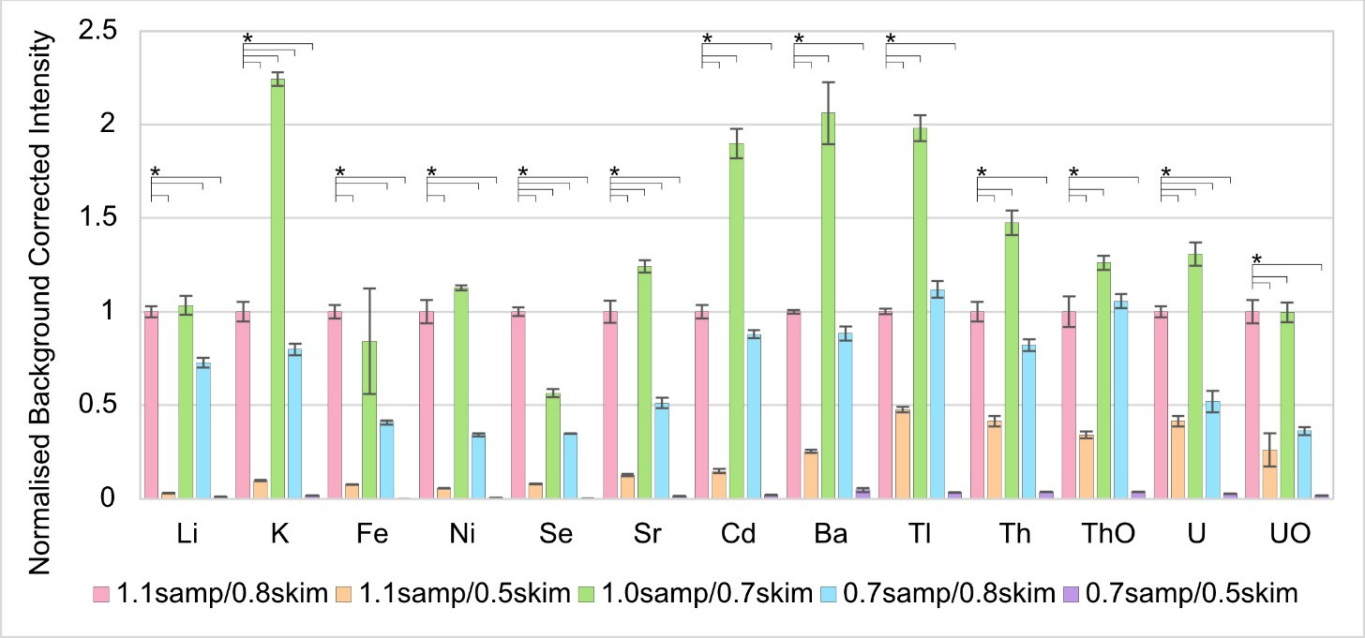
Supplementary Figure S2. Normalised signal intensity plot for comparison of four cone sets to the standard cone set (1.1 mm sampler / 0.8 mm skimmer) for analysis of a 1 ppb solution using wet plasma ICP-MS. Error bars represent +/- 1 standard deviation for mean signal intensity where n=3, normalised to standard cone orifice set. Elements arranged in increasing mass-to-charge from left to right. All differences in intensity between standard cone set and other sets are statistically significant (t-test).



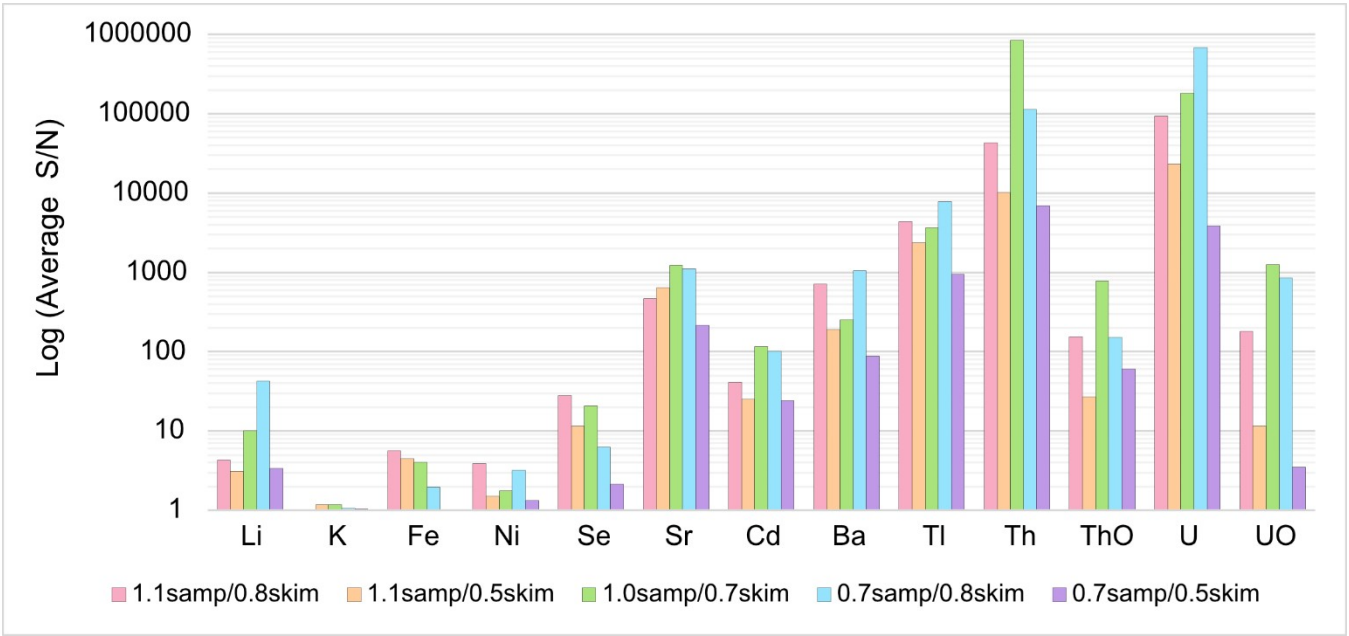
Supplementary Figure S3. Normalised signal intensity plot for comparison of four cone sets to the standard cone orifice size (1.1 mm sampler / 0.8 mm skimmer) for analysis of a 1 ppb solution using wet plasma ICP-MS, with altered y-axis for ease of view. Error bars represent +/- 1 standard deviation for mean signal intensity where n=3, normalised to standard cone orifice set. Elements arranged in increasing mass-to-charge from left to right.



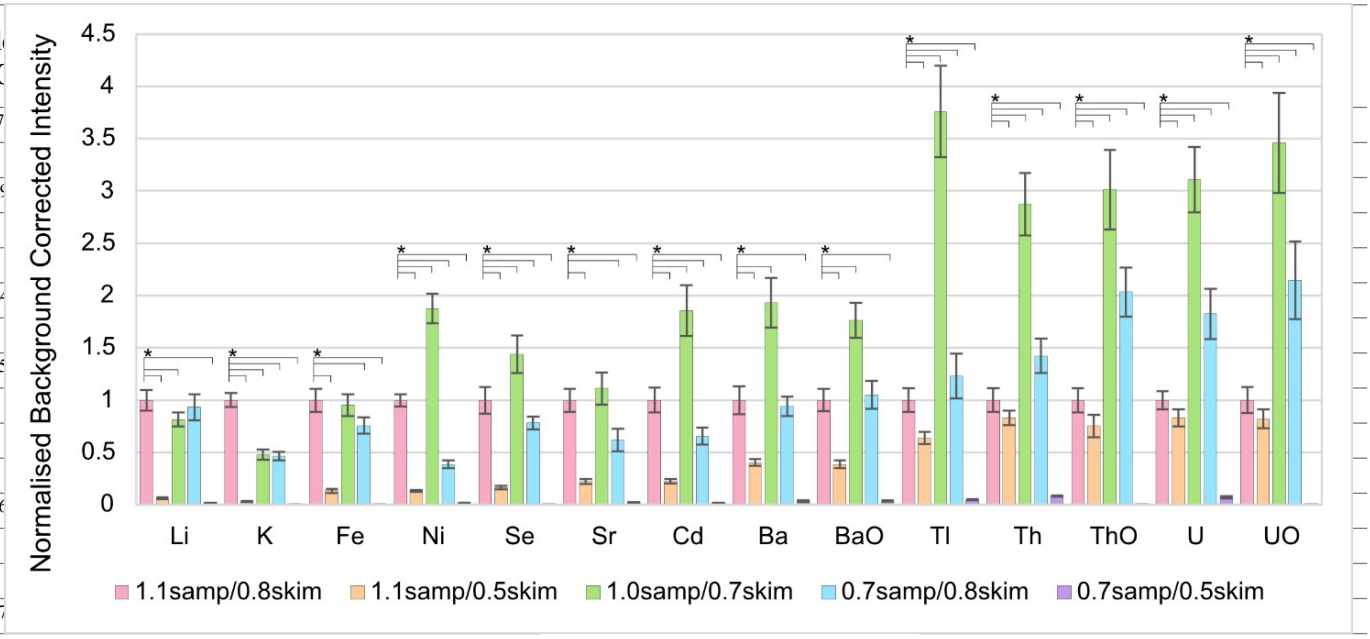
Supplementary Figure S4. Signal-to-noise ratio plot for comparison of four cone sets to the standard set (1.1 mm sampler / 0.8 mm skimmer) for analysis of a 1 ppb solution using wet plasma ICP-MS. Elements arranged in increasing mass-to-charge from left to right.



Supplementary Figure S5. Normalised background subtracted signal intensity plot for comparison of four cone sets to the standard set (1.1 mm sampler / 0.8 mm skimmer) for dry plasma experimental setup using LA-ICP-MS analysis of gelatine spots. Error bars represent +/- 1 standard deviation for mean signal intensity where n=3, normalised to standard set. Elements arranged in increasing mass-to-charge ratio from left to right. Horizontal lines with asterisks represent a statistically significant difference between the connected data bars at 95% confidence (t-test).

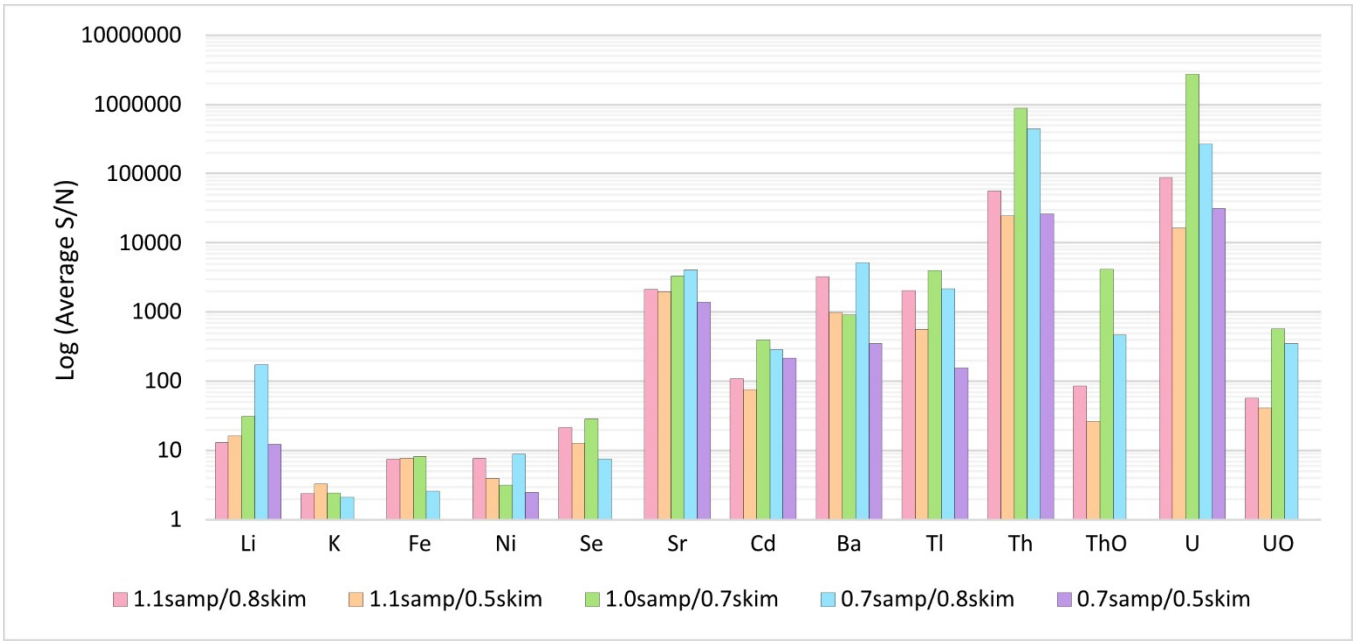


Supplementary Figure S6. Signal-to-noise ratio plot for comparison of four cone sets to the standard set (1.1 mm sampler / 0.8 mm skimmer) for dry plasma experimental setup using LA-ICP-MS analysis of gelatine spots, taking the gas blank as noise. Elements arranged in increasing mass-to-charge from left to right.



76.92597	-	$Ni^{61}O^{16}$	1.13	

Supplementary Figure S7. Normalised background subtracted signal intensity plot for comparison of four cone sets to the standard set (1.1 mm sampler / 0.8 mm skimmer) for dry plasma experimental setup using LA-ICP-MS analysis of NIST 610 glass reference material. Error bars represent +/- 1 standard deviation for mean signal intensity where n=3, normalised to standard cone orifice set. Elements arranged in increasing mass-to-charge ratio from left to right. Horizontal lines with asterisks represent a statistically significant difference between the connected data bars at 95% confidence (t-test).



Supplementary Figure S8. Signal-to-noise ratio plot for comparison of four cone sets to the standard set (1.1 mm sampler / 0.8 mm skimmer) for dry plasma experimental setup using LA-ICP-MS analysis of NIST 610 glass. Elements arranged in increasing mass-to-charge from left to right.

Se^{78}	77.91730	23.60				-	-
	77.92326	-				$Ni^{62}O^{16}$	3.58
	77.92773	-				$K^{41}Cl^{37}$	1.63
	77.92512	-				$Ar^{39}Ar^{39}$	12.55
Sr^{88}	87.90562	82.58	5.70	11.03	42.89	-	-
Cd^{111}	110.90418	12.80	8.99	16.91	37.48	-	-
Ba^{137}	136.90582	11.23	5.21	10.00	37.31	-	-
	136.91238	-				$Ba^{136}H^{1}$	7.81
$Ba^{138}O^{16}$	153.90015	71.49				-	-
	153.91512	-				$Ba^{137}O^{16}H^{1}$	7.79
Tl^{205}	204.97441	70.48	6.11	20.43	29.83	-	-
Th^{232}	232.03805	100.00	6.08	11.50	20.00	-	-
$Th^{232}O^{16}$	248.03297	99.76				-	-
U^{238}	238.05079	99.27	6.19	14.72	-	-	-
$U^{238}O^{16}$	254.04570	99.04				-	-

Supplementary Table S2. Table showing the percentage change of average background subtracted intensity between the standard cone set (1.1 samp / 0.8 skim) and the next smallest (1.0 samp / 0.7 skim) combination for the elements investigated.

Element/Oxide	% Difference		
	Solution	Gelatine	NIST 610
Li	- 84.8	+ 3.3	- 18.9
K	- 77.1	+ 124.3	- 52.1
Fe	- 125.8	- 15.7	- 6.1
Ni	- 72.8	+ 12.9	+ 79.6
Se	- 77.3	- 43.5	+ 43.1
Sr	- 67.8	+ 24.3	+ 11.0
Cd	- 66.6	+ 89.9	+ 82.9
Ba	- 57.4	+ 106.1	+ 91.7
Tl	- 53.8	+ 97.9	+ 271.9
Th	- 49.3	+ 47.4	+ 183.2
ThO	- 46.4	+ 26.1	+ 195.9
U	- 48.1	+ 30.8	+ 205.9
UO	- 35.7	- 0.3	+ 239.5