

Electronic Supplementary Information for: Application of microsecond Pulsed Glow Discharge for bulk elemental analysis to modern commercially available Optical Emission Spectrometers

M. Voronov^{*1,2}, V. Hoffmann¹

¹ IFW Dresden, Institute for Complex Materials, P.O. Box 270116, D-01171 Dresden, Germany

² Kazan National Research Technical University, K. Marx str. 10, 420111, Kazan, Russia

E-mail: VoronovMV@mail.ru

Table S-1. List of PMT channels (namely elements and their wavelengths) used for investigation of background and noises with PMT detection.

Spectral line (nm)
B I 209.0
Mg I 383.8
Si I 288.2
Ti II 337.3
V I 411.2
Cr I 425.4
Mn I 403.4
Fe II 238.2
Fe I 372.0
Co I 345.4
Ni I 341.5
Zr I 360.1
Nb II 316.3
Mo I 386.4
Sn I 303.4
Sb I 206.8
W I 429.5
Ta I 362.7
Pb II 220.4
Cl I 133.6
Pd I 340.5
Pt I 265.9
Ca II 393.4
Cd I 228.8

Table S-2. List of samples used for investigation of spectral lines with CCD detection.

№	Matrix	Sample	Additional information
1	Fe 80.47%, Si 10.06%, Nb 5.95%, B 2.03%, Cu 1.07%	IFW Kal2	This is a home made calibration sample produced and wet chemically characterized by ICP-OES at IFW Dresden
2	Ti 85.5%, Al 5.57%, V 5.57%, Sn 1.99%	IARM 178B	This CRM was delivered by ARMI (Analytical Reference Materials International Corporation, 700 Corporate Circle, Suite A, Golden Colorado 80401-5636, USA)
3	Cu 82.7%, Zn 7.55%, Si 5.95%, Al 1.9%	MBH WSB1	This CRM is from MBH Analytical LTD., Holland House, Queens Road, Barnet, EN5 4DJ, England. Cu is not certified in this sample, but was measured by 4 laboratories by FAAS, ICP, volumetric (thiosulfate) and electrogravimetric with a standard deviation of 0.23 m%.
4	Ni 41.8%, Cr 29.43%, Fe 14.61%, Mo 5.02%, W 2.66%, Co 2.58%, Cu 1.66%, Mn 1.1%	BSC H-8	This CRM is from Brammer Standard Company, Inc. 14603 Benfer Road, Houston, TX 77069-2807 USA
5	Ti 85.7%, Al 5.87%, Zr 4.05%, Mo 2%, Sn 1.97%	IARM 177A	This CRM was delivered by ARMI (Analytical Reference Materials International Corporation, 700 Corporate Circle, Suite A, Golden Colorado 80401-5636, USA)
6	Pb 66.8%, Sn 29.5%, Sb 1.8%, Ag 2.1%, Cu 1.4	SUS R Pb 15/54	This is a recalibration sample from Ulrich Nell, Feldstrasse 23, D - 46149 Oberhausen

Table S-3. List of elements and their wavelengths used for comparison of plasma radiation intensity in μ s-PGD and continuous GD with CCD detection. The data are taken from PLASUS SpecLine 1.32 database.

Spectral line (nm)	Energy of higher transition level (eV)	Energy of lower transition level (eV)
Ag I 328.1	3.78	0
Ag I 338.3	3.66	0
Al II 167.1	7.42	0
Al I 394.4	3.14	0
Al I 396.2	3.14	0.01
B I 249.7	4.96	0
B I 249.8	4.96	0
Co I 345.4	4.02	0.43
Cr II 267.7	6.16, 6.18	1.53, 1.55
Cr I 357.9	3.46	0
Cr I 359.3	3.45	0
Cr I 360.5	3.44	0
Cr I 425.4	2.91	0
Cr I 427.5	2.9	0
Cr I 520.6	3.32	0.94
Cr I 534.6	3.32	1
Cu II 224.7	8.23	2.72
Cu I 249.2	4.97	0
Cu I 261.8	6.12	1.39
Cu I 282.4	5.78	1.39
Cu I 296.1	5.57	1.39
Cu I 324.8	3.82	0
Cu I 327.4	3.79	0
Cu I 368.7	7.18	3.82
Cu I 465.1	7.74	5.07
Cu I 510.6	3.82	1.39
Cu I 521.8	6.19	3.82
Cu I 522.0	6.19	3.82
Cu I 578.2	3.79	1.64
Fe II 238.2	5.2	0
Fe I 372.0	3.33	0
Fe I 373.7	3.37	0.05
Mn I 403.1	3.08	0
Mn I 403.4	3.07	0
Mn I 482.4	4.89	2.32
Mo I 386.4	3.21	0
Nb II 316.3	4.29	0.38
Nb II 319.5	4.21	0.33
Ni II 216.6	6.76	1.04
Ni II 220.7	6.87	1.25
Ni II 221.6	6.63	1.04
Ni I 341.5	3.66	0.03
Ni I 345.8	3.8	0.21
Ni I 352.5	3.54	0.03
Pb II 167.2	9.16	1.75
Pb II 168.2	7.37	0

Pb II 172.7	7.18	0
Pb II 179.7	8.65	1.75
Pb II 220.4	7.37	1.75
Pb I 261.4	5.71	0.97
Pb I 283.3	4.38	0
Pb II 438.6	11.47	8.65
Si I 251.6	4.95	0.03
Si I 288.2	5.08	0.78
Sn II 169.9	7.3	0
Sn II 175.8	7.05	0
Sn I 284.0	4.79	0.42
Sn I 286.3	4.33	0
Sn I 300.9	4.33	0.21
Sn I 317.5	4.33	0.43
Sn I 326.2	4.87	1.07
Sn I 333.1	4.79	1.07
Sn I 380.1	4.33	1.07
Ti II 334.2	4.28	0.57
Ti II 337.3	3.69	0.01
Ti I 365.4	3.44	0.05
Ti II 375.9	3.9	0.61
V II 310.2	4.36	0.37
V I 411.2	3.32	0.3
V I 439.0	3.1	0.28
W I 407.4	3.41	0.37
Zn I 334.5	7.78	4.08
Zr I 360.1	3.6	0.15

Table S-4. List of calibration samples used for calibration with Cu lines.

Matrix	Cu concentration (m%)	Sample	
Cu 99.9%	99.9	IARM 70B	This CRM was delivered by ARMI (Analytical Reference Materials International Corporation, 700 Corporate Circle, Suite A, Golden Colorado 80401-5636, USA)
Cu 98%, Be 1.7%	98	Self-made	A self-made reference sample produced in IDW Dresden
Cu 92.5%, Sn 7.5%	92.5	CuSn8	Technical bronze, Schreier Metall
Cu 76%, Ag 24%	76	Self-made	A self-made reference sample produced in IDW Dresden
Cu 69.1%, Ni 29.6%	69.1	IARM 85B	This CRM was delivered by ARMI (Analytical Reference Materials International Corporation, 700 Corporate Circle, Suite A, Golden Colorado 80401-5636, USA)
Cu 60.5%, Zn 32%	60.5	CRM Brass M233	Certified Reference Material from ASSO, Mtsensk, USSR
Cu 58.3%, Zn 39.8%	58.3	IARM 83A	This CRM was delivered by ARMI (Analytical Reference Materials International Corporation, 700 Corporate Circle, Suite A, Golden Colorado 80401-5636, USA)
Cu 58%, Zn 39%, Pb 3%	58%	CuZn39Pb3	Technical brass, Schreier Metall