Nonlinear Multivariate Regression Algorithms for Improving Precision of Multisensor Potentiometry in Analysis of Spent Nuclear Fuel Reprocessing Solutions

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SUPPLEMENTARY MATERIAL

Table S1. Sensor membrane composition

Sensor	Ligand	Cation exchanger
S1	N,N′,N,N′- Tetraisobutyl diamide of dipicolinic acid	KTFPB
S2	1,9-Bis-(diphenylcarbamoyl)-2,5,8-trioxanonane	CCD
S3	Tetraphenylmethylene diphosphine dioxide	KTFPB
S4	N,N,N′,N′-Tetraoctyldiamide of diglycolic acid	CCD
S5	N,N′-Dimethyl-N,N′-dicyclo-hexyldiamide of dipicolinic acid	KTFPB
S6	1,9-Bis-(diphenylphosphynyl) 3,6-dibenzo-2,8-dioxa-5-methyl-phosphineoxanonane	KTFPB
S7	5,11,17,23-Tetra(diethylcarbamoyl-ethoxymethylcarboxamido)-25,26,27,28-tetrapropoxycalix[4]aren	CCD
S8	Phenyloctyl-N,N-di-i-butylcarbamoyl-methylen phosphineoxide	CCD

S9	Pyridine-2,6-dicarboxylic acid bis(1,2,3,4-tetrahydroquinolide)	KTFPB
S10	N,N′-diethyl-N,N′-diphenyldiamide of 2,2′-dipyridyl-6,6′-dicarboxylic acid	KTFPB
S11	N,N′-Diethyl-N,N′-di(p-fluoro)phenyl diamide of dipicolinic acid	KTFPB
S12	1,6-Bis-(benzylphenylcarbamoyl)-3-benzo-2,5-oxahexane	KTFPB
S13	N, N′-Diethyl-N, N′-di-p-tolyldiamide of dipicolinic acid	KTFPB
S14	Diphenyl-N,N-di-n-butylcarbamoyl-methylphosphinoxide	CCD
S15	1,18-Bis-(diphenylphosphynyl) 2,5,8,11,14,17-hexaoxaoctadecane	CCD
S16	1,9-Bis-(diphenylphosphynyl)- 2,5,8-trioxanonane	CCD
S17	N2,N2,N9,N9-Tetrabutyl -1,10- phenanthroline-2,9-dicarboxamide	KTFPB

Table S2. Elemental composition of the samples taken from the pilot extraction unit.

Sample	La	Ce	Pr	Nd	Sm	Eu	Zr	Mo	Cr	Mg	Mn	Ca	Na	K	Ni	U	Y	Zn	Ru	Fe	Cm	Am
b1	0.1	0.1	0.1	10.1	2.6	0.1	2.3	2.5	28.0	73.3	38.1	80.9	3968.0	17.6	213.1	11.2	0.0	10.5	50.6	4477.2	-	0.3
b2	0.1	0.1	0.1	4.9	2.6	0.1	17.5	1.8	24.9	68.0	35.0	131.9	3572.0	23.3	204.3	8.4	0.0	9.7	47.6	4201.0	-	0.2
b3	1.3	0.6	0.1	4.7	2.6	0.1	46.7	2.1	26.7	72.0	37.5	305.8	3314.1	19.6	210.6	10.0	0.5	10.0	50.9	4409.8	0.00	0.2
b4	16.4	3.9	1.8	8.7	1.4	0.1	90.9	2.3	24.7	66.9	34.0	469.5	3797.6	18.2	192.8	8.1	0.0	9.9	46.3	4007.9	0.00	0.2
b5	79.8	17.3	2.4	4.3	1.2	0.1	376.5	2.2	17.3	52.2	21.9	430.3	8319.2	30.5	126.2	10.8	0.0	8.0	32.8	2510.0	0.00	0.4
b6	209.1	104.5	2.3	8.6	2.0	0.1	1103.3	2.1	6.1	34.9	7.0	240.9	13977.9	45.6	39.7	54.4	0.1	7.8	16.6	760.9	0.02	0.8
b7	0.3	0.7	0.1	2.3	2.8	0.3	6.8	0.9	1.0	28.2	0.2	62.2	87.5	10.9	5.9	4.6	0.0	8.0	1.1	9.7	0.00	0.5
b8	0.8	2.7	1.6	2.4	2.9	0.1	11.2	0.6	1.2	27.1	0.3	60.8	63.0	14.6	0.9	11.9	0.0	7.8	1.1	1.2	0.01	0.9
b9	12.6	31.0	1.8	11.0	1.7	0.1	16.4	0.6	1.5	28.2	0.2	66.9	50.6	10.5	1.3	67.8	0.1	9.0	0.9	0.5	0.11	1.3

b10	16.2	40.6	2.5	14.3	1.8	0.1	11.3	0.6	1.2	27.1	0.2	63.4	48.8	9.5	2.0	75.9	0.2	7.3	1.1	0.0	0.15	1.3
b11	11.2	29.4	3.1	11.7	1.9	0.1	1.4	0.7	1.1	27.4	0.4	65.9	45.8	11.3	1.5	47.2	0.1	7.0	1.6	0.0	0.11	0.9
b12	0.1	2.6	0.1	2.1	3.6	0.3	74.3	1.1	2.1	27.5	0.2	60.9	64.6	11.0	1.9	435.3	0.1	7.6	3.2	12.0	6.34	28.4
b13	0.1	3.9	0.1	3.5	7.3	0.8	69.2	1.2	1.7	27.6	0.3	61.1	47.9	13.5	1.2	589.3	0.0	8.3	4.0	8.8	13.02	33.8
b14	0.8	6.1	1.1	17.3	18.0	2.1	70.0	1.0	1.7	28.4	0.3	62.2	49.2	7.7	1.1	680.2	0.5	10.0	3.0	7.1	15.02	39.2
b15	12.3	56.0	10.6	72.7	39.2	5.3	92.3	1.4	1.5	27.9	0.3	63.5	48.0	12.0	1.0	741.7	3.2	8.4	4.9	6.8	9.01	44.7
b16	10.5	49.6	11.3	84.7	49.0	6.7	23.5	1.4	2.1	28.1	0.2	64.2	48.1	14.7	0.9	524.5	4.1	8.1	2.0	6.4	11.01	36.5
b17	11.9	55.9	14.3	100.7	62.1	8.9	9.5	1.8	1.7	27.9	0.2	65.7	47.0	12.2	1.6	416.3	4.9	8.9	1.6	6.6	11.68	28.4
b18	16.5	70.7	20.8	145.5	83.1	11.9	5.1	2.2	1.6	27.9	0.4	64.5	47.4	10.2	0.0	330.0	6.2	7.5	0.7	6.5	2.14	21.7
b19	18.4	80.9	23.3	158.9	93.7	13.1	3.4	2.3	1.5	27.1	0.2	65.8	48.8	10.1	1.7	229.8	6.9	7.4	1.7	6.3	4.34	17.6
b20	18.6	79.4	23.1	162.0	97.3	13.9	3.9	2.4	2.0	26.8	0.4	65.6	49.2	10.7	0.0	156.9	7.7	7.7	0.0	7.0	0.93	12.0
b21	20.0	84.6	26.7	181.7	101.6	14.4	2.3	2.7	1.6	27.1	0.3	66.8	51.4	9.0	1.2	112.3	8.5	7.3	1.4	7.3	0.37	9.9
b22	19.8	86.7	27.8	184.0	96.4	14.0	1.5	2.6	1.3	27.1	0.3	65.2	47.7	12.3	1.4	77.0	9.0	7.3	0.8	6.4	0.15	7.8
b23	14.1	69.5	23.7	155.9	70.9	10.2	1.2	2.1	1.0	27.0	0.2	65.7	48.7	9.3	0.6	48.1	8.3	7.1	0.0	6.2	0.03	5.7

Figure S1. Visual appearance of the multisensor system.