

Supporting Information

Rapid quantitative analysis of the acidity of iron ore by laser-induced breakdown spectroscopy (LIBS) technique coupled with variable importance measurement-random forest (VIM-RF)

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Table S1 Variable numbers, RMSECV, R_{CV}^2 values and modeling time with different variable importance for CaO analysis

Variable importance	Variable numbers	R_{CV}^2	RMSECV(wt%)	Modeling time (s)
Full spectrum	51234	0.9408	0.3533	40.25
0	3355	0.9027	0.4235	2.160
0.01	824	0.9328	0.3557	0.665
0.02	538	0.9262	0.3714	0.482
0.03	410	0.9244	0.3753	0.380
0.04	389	0.9321	0.3578	0.362
0.05	360	0.9274	0.3676	0.354
0.06	315	0.9267	0.3697	0.320
0.07	217	0.9244	0.3743	0.250
0.08	145	0.9133	0.3994	0.242
0.09	86	0.9190	0.3869	0.120
0.10	61	0.9072	0.4121	0.112

Table S2 Variable numbers, RMSECV, R_{CV}^2 values and modeling time with different variable importance for SiO₂ analysis

Variable importance	Variable numbers	R_{CV}^2	RMSECV(wt%)	Modeling time (s)
Full spectrum	51234	0.9366	0.3691	40.12
0	3355	0.9067	0.4184	2.060
0.01	824	0.8921	0.4430	0.642
0.02	538	0.9058	0.4177	0.462
0.03	410	0.9148	0.3999	0.365
0.04	389	0.9075	0.4148	0.354
0.05	360	0.9071	0.4145	0.342
0.06	315	0.9098	0.4109	0.312
0.07	217	0.9075	0.4158	0.242
0.08	145	0.9043	0.4192	0.223
0.09	86	0.9020	0.4255	0.112
0.10	61	0.9092	0.4113	0.108

Table S3 Variable numbers, RMSECV, R_{CV}^2 values and modeling time with different variable importance for Al₂O₃ analysis

Variable importance	Variable numbers	R_{CV}^2	RMSECV(wt%)	Modeling time (s)
220-450	26917	0.9455	0.3226	19.76
0	3355	0.8911	0.4551	2.260
0.01	824	0.8906	0.4662	0.565
0.02	538	0.8775	0.4771	0.462
0.03	410	0.8772	0.4822	0.382
0.04	389	0.8766	0.4844	0.352
0.05	360	0.8721	0.4895	0.340
0.06	315	0.8642	0.5031	0.322
0.07	217	0.8654	0.5113	0.254
0.08	145	0.8677	0.5223	0.232

0.09	86	0.8544	0.5334	0.120
0.10	61	0.8522	0.5441	0.102
