Supporting information for

The Rapid Detection of Bioavailable Micronutrients Cu/Fe/Zn/Mn in Soil Using Laser-Induced Breakdown Spectroscopy Combined with Solid-Liquid-Solid Transformation

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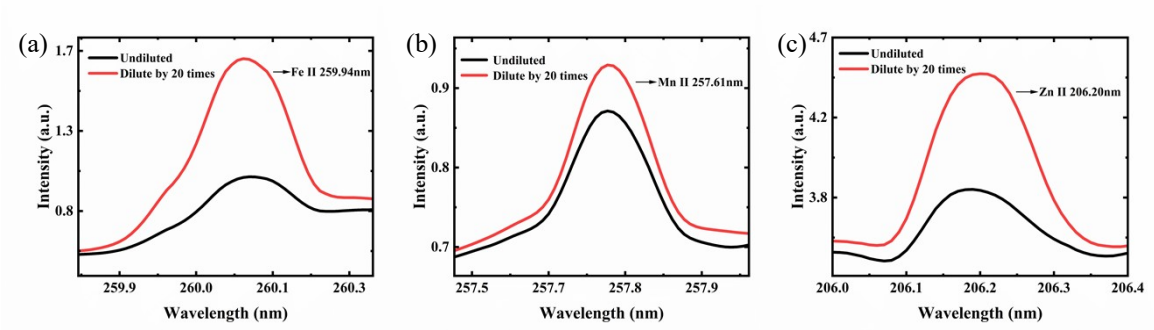

Fig. S1. (a)-(c) Comparison of target element signal intensities of soil extract samples before dilution and after dilution by 20 times

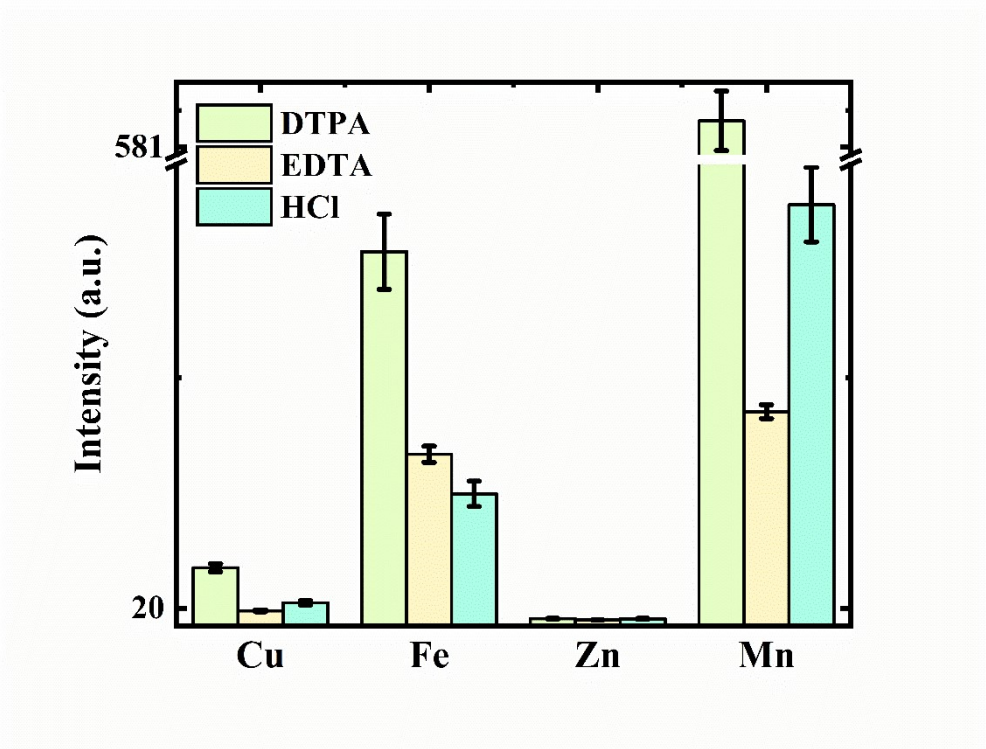

Fig. S2. Comparison of spectral intensities obtained from soil extraction with three extractants

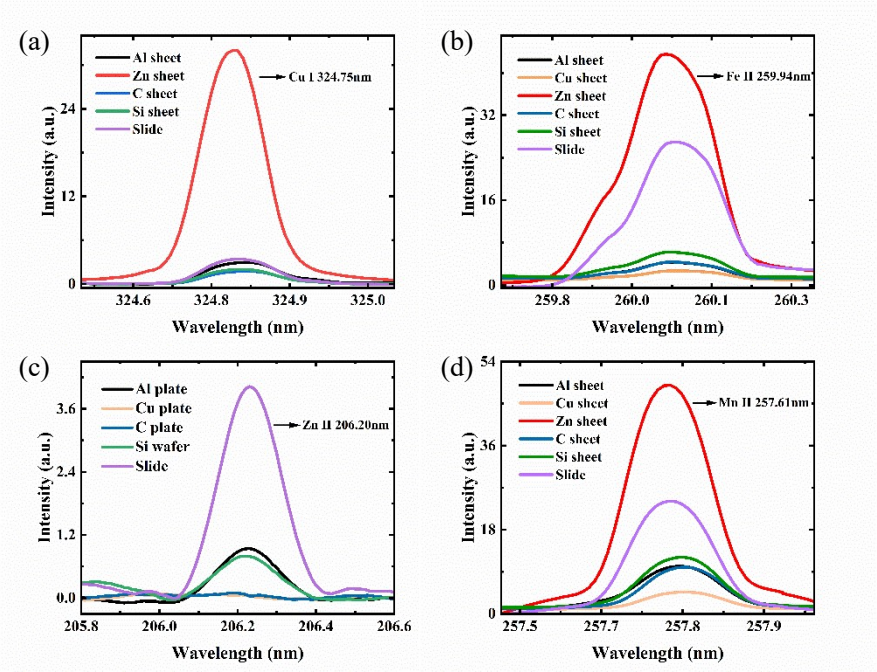

Fig. S3. (a)-(d) Comparison of spectral intensities of target elements at different substrates

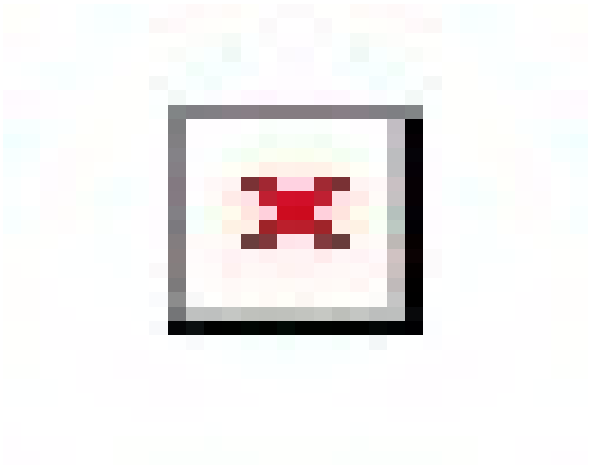

Fig. S4. (a)-(d) Effect of liquid-soil ratio on spectral intensity

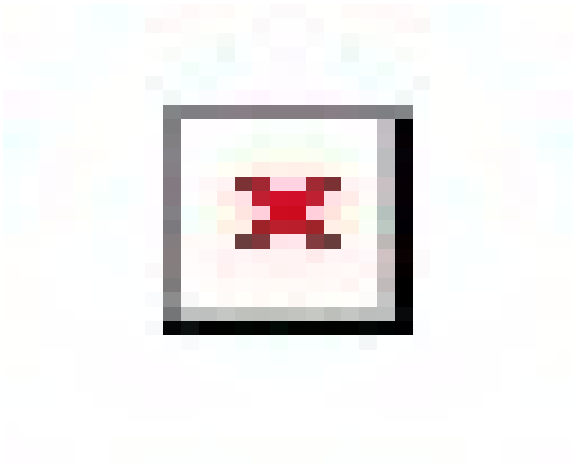

Fig. S5. (a)-(d) Effect of different oscillation times on spectral intensity

Table S1. Soil validation set and recovery rate calculation

Simple No.	Element(content)	Added(mg/kg)	Found	Recovery
Soil sample 2	Cu(0.456mg/kg)	0	0.440	96.4%
		6	6.895	106.8%
		30	26.375	86.6%
	Fe(0.901 mg/kg)	0	1.088	120.7%
		6	5.838	84.6%
		30	27.595	89.3%
	Zn(0.477mg/kg)	20	19.207	93.8%
		80	93.756	116.5%
		200	167.999	83.8%
	Mn(3.779mg/kg)	0	4.595	121.6%
		6	11.031	112.8%
		30	32.799	97.1%
Soil sample 3	Cu(0.670mg/kg)	0	0.661	98.6%
		6	7.490	112.3%
		30	36.313	118.4%
	Fe(3.146mg/kg)	0	2.809	89.3%
		6	9.942	108.7%
		30	28.605	86.3%
	Zn(2.961mg/kg)	20	22.410	97.6%
		80	82.297	99.2%
		200	219.807	108.3%
	Mn(12.592mg/kg)	0	12.416	98.6%
		6	16.119	86.7%
		30	36.161	84.9%
Soil sample 4	Cu(0.789mg/kg)	0	0.748	94.8%
		6	6.361	93.7%
		30	32.821	106.6%
	Fe(4.650mg/kg)	0	5.436	116.9%
		6	10.022	94.1%
		30	38.739	111.8%
	Zn(1.512mg/kg)	20	20.415	94.9%
		80	66.514	81.6%
		200	198.89	98.7%
	Mn(7.118mg/kg)	0	6.677	93.8%
		6	14.023	106.9%
		30	41.721	112.4%