

Table S1 Fugitive state and distribution of arsenic in pyrite cinder						%
Minerals	Mineral phases	As ₂ O ₅	As ₂ S ₃	FeAsO ₄	Other phases	Total
Calcine	Phase content	0.0020	0.0151	0.2307	0.0322	0.28
	Fraction	0.71	5.39	82.39	11.51	100

Table S2 Chemical composition of roasting ball								%
Item	TFe	FeO	SiO ₂	Al ₂ O ₃	CaO	MgO	S	P
Pellets	61.10	0.28	6.91	1.14	1.84	0.58	0.0038	0.015
Industrial index	≥60		≤7				≤0.1	≤0.1
Item	K ₂ O	Na ₂ O	As	CuO	TiO ₂	PbO	ZnO	MnO ₂
Pellets	0.29	0.15	0.014	0.092	0.198	0.088	0.030	0.173
Industrial index			≤0.05					

Table S3 Chemical composition and metallurgical properties								
Project		Chemical composition/wt%				Metallurgical performance/wt%		
		TFe	SiO ₂	S	P	RSI	RI	RDI _{+3.15}
Product grade	Grade I	≥65.0	≤3.50	≤0.02	≤0.03	≤15.0	≥75.0	≥75.0
	Grade II	≥62.0	≤5.50	≤0.06	≤0.06	≤20.0	≥70.0	≥70.0
	Grade III	≥60.0	≤7.00	≤0.10	≤0.10	≤22.0	≥65.0	≥65.0
Fired pellets		61.1	6.91	0.0038	0.015	6.91	65.57	99.51

Table S4 Physical characteristics of the pellets						
Project		Compressive strength (N/per ball)	Tumble index (>6.3 mm)/%	Wear resistance index (<0.5 mm)/%	Particle size distribution/%	
					8 mm–16 mm	<5 mm
Product grade	Grade I	≥2500	≥92.0	≤5.0	≥95.0	≤3.0
	Grade II	≥2300	≥90.0	≤6.0	≥90.0	≤4.0
	Grade III	≥2000	≥86.0	≤8.0	≥85.0	≤5.0
Fired pellets		3071	94.7	2.6	96.7	1.1

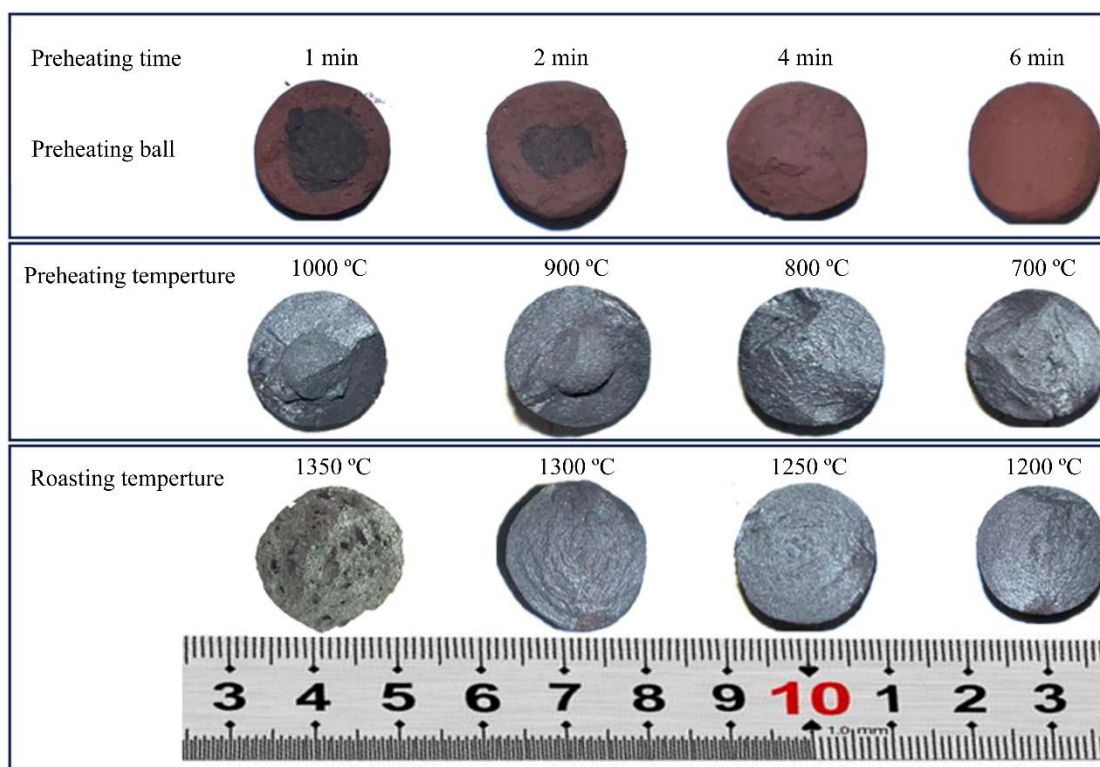


Figure S1 Macroscopic view of preheating and roasting pellets

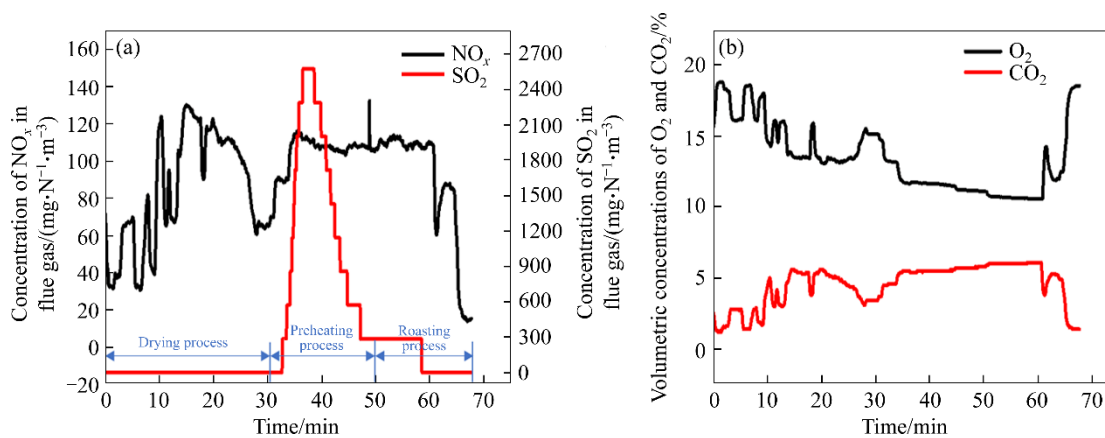


Figure S2 Variation of flue gas flow during pellet roasting