Supporting Information

Micro-Raman Study of Chinese Iron-Based Brown Wares Produced During Song Dynasty (960–1279 CE): Probing Crystals in the Glazes

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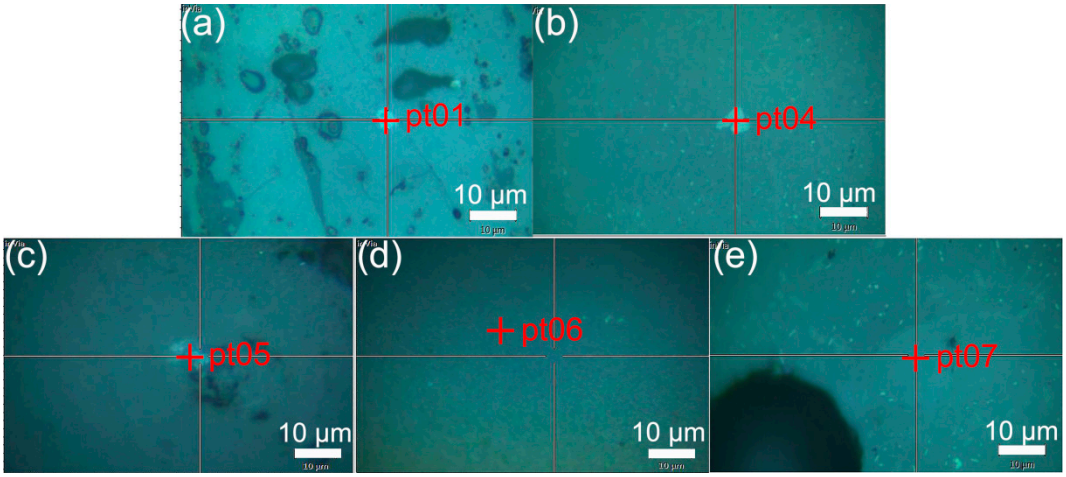


Figure S1. Optical observations of submicron-scale crystals in glaze surfaces of the samples: (pt01 and pt04) DYY-05, (pt06) GQC-05 and (pt05 and pt07) HYY-06.

Table S1. Analytical results (wt%) obtained by lab-XRF on the glaze surfaces of all samples. At least three analyzed points were performed in each sample to estimate the homogeneity. The mean and standard deviation (in brackets, abbreviated as SD) are given.

Samples	Oxides	Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Fe_2O_3
HYY-01	Average	0.36	2.59	14.46	68.13	2.92	4.52	0.70	6.33
	SD	(0.08)	(0.10)	(0.09)	(0.43)	(0.20)	(0.09)	(0.01)	(0.09)
HYY-02	Average	1.26	3.48	15.09	66.06	3.05	6.03	0.70	4.31
	SD	(0.10	(0.10)	(0.15)	(0.07)	(0.11)	(0.08)	(0.00)	(0.19)
HYY-03	Average	0.72	1.80	15.57	67.17	3.60	3.92	0.79	6.42
	SD	(0.12	(0.17)	(0.15)	(0.15)	(0.09)	(0.20)	(0.00)	(0.10)
HYY-04	Average	0.72	1.53	16.33	69.38	1.68	5.34	0.66	4.36
	SD	(0.22	(0.17)	(0.26)	(0.35)	(0.10)	(0.13)	(0.07)	(0.11)
HYY-05	Average	0.89	2.05	16.06	66.90	1.76	6.12	0.77	5.45
	SD	(0.06	(0.93)	(0.65)	(0.93)	(0.94)	(0.87)	(0.14)	(0.28)
HYY-06	Average	0.82	1.47	16.60	66.53	0.60	7.26	0.97	5.75
	SD	(0.04	(0.26)	(0.08)	(0.47)	(0.06)	(0.11)	(0.05)	(0.03)
JXY-01	Average	0.54	1.03	16.98	68.46	3.29	2.36	0.93	6.40
	SD	(0.08)	(0.07)	(0.06)	(0.06)	(0.04)	(0.04)	(0.01)	(0.03)
JXY-02	Average	0.68	1.49	16.74	68.93	3.04	2.72	0.78	5.61
	SD	(0.17)	(0.14)	(0.26)	(0.38)	(0.07)	(0.18)	(0.00)	(0.18)
JXY-03	Average	0.50	1.55	16.78	68.06	3.25	3.06	0.77	6.04
	SD	(0.28)	(0.05)	(0.42)	(0.09)	(0.05)	(0.07)	(0.03)	(0.10)
DYY-01	Average	0.70	1.24	16.76	68.81	2.73	2.28	0.90	6.60
	SD	(0.20)	(0.04)	(0.23)	(0.23)	(0.08)	(0.11)	(0.02)	(0.12)
DYY-02	Average	0.93	1.34	16.95	68.32	2.52	2.24	0.87	6.82
	SD	(0.16)	(0.12)	(0.06)	(0.09)	(0.06)	(0.06)	(0.00)	(0.25)
DYY-03	Average	1.01	1.87	16.91	67.25	2.27	3.26	0.81	6.62
	SD	(0.32)	(0.22)	(0.43)	(0.36)	(0.10)	(0.08)	(0.00)	(0.12)
DYY-04	Average	0.85	1.29	16.47	69.05	2.05	3.16	0.82	6.30

	SD	(0.17)	(0.08)	(0.20)	(0.68)	(0.09)	(0.07)	(0.01)	(0.48)
DYY-05	Average	0.46	1.08	16.60	67.92	2.58	3.33	1.13	6.90
	SD	(0.17)	(0.37)	(0.25)	(0.31)	(0.08)	(0.20)	(0.06)	(0.24)
DYY-06	Average	0.63	1.22	16.79	68.04	2.45	3.10	1.05	6.72
	SD	(0.20)	(0.11)	(0.18)	(0.17)	(0.12)	(0.18)	(0.10)	(0.20)
GQC-01	Average	0.62	0.77	15.76	70.07	3.30	2.63	0.80	6.04
	SD	(0.10)	(0.19)	(0.22)	(0.19)	(0.15)	(0.07)	(0.00)	(0.14)
GQC-02	Average	0.61	0.83	15.51	69.82	3.76	3.05	0.85	5.58
	SD	(0.23)	(0.03)	(0.08)	(0.22)	(0.06)	(0.03)	(0.01)	(0.10)
GQC-03	Average	0.69	0.81	16.06	70.03	3.70	2.73	0.86	5.10
	SD	(0.46)	(0.05)	(0.07)	(0.48)	(0.04)	(0.03)	(0.02)	(0.05)
GQC-04	Average	0.59	0.67	15.41	70.34	3.67	2.54	0.79	6.00
	SD	(0.40)	(0.11)	(0.19)	(0.99)	(0.12)	(0.09)	(0.05)	(0.29)
GQC-05	Average	0.19	1.09	15.10	68.32	3.23	4.34	0.76	6.96
	SD	(0.22)	(0.07)	(0.07)	(0.30)	(0.04)	(0.12)	(0.02)	(0.03)
GQC-06	Average	0.47	1.09	15.24	69.46	3.62	3.41	0.89	5.83
	SD	(0.03)	(0.06)	(0.05)	(0.34)	(0.11)	(0.08)	(0.03)	(0.21)
GQC-07	Average	0.68	0.98	15.26	69.49	3.35	3.56	0.79	5.89
	SD	(0.14)	(0.05)	(0.06)	(0.12)	(0.04)	(0.05)	(0.01)	(0.02)
GQC-08	Average	0.95	0.63	16.41	68.88	3.53	2.75	0.87	5.99
	SD	(0.30)	(0.03)	(0.13)	(0.23)	(0.03)	(0.03)	(0.00)	(0.04)
CGY-01	Average	0.05	0.86	15.96	68.81	2.61	3.96	0.81	6.93
	SD	(0.01)	(0.06)	(0.02)	(0.45)	(0.07)	(0.09)	(0.03)	(0.20)
CGY-02	Average	0.84	0.60	16.89	68.48	2.53	3.42	0.83	6.75
	SD	(0.58)	(0.09)	(0.56)	(0.09)	(0.11)	(0.15)	(0.03)	(0.03)
CGY-03	Average	0.32	0.55	17.03	69.49	3.24	2.60	0.83	5.95
	SD	(0.39	(0.19)	(0.13)	(1.28)	(0.20)	(0.20)	(0.03)	(0.55)
CGY-04	Average	0.30	0.67	16.23	69.41	3.09	2.89	0.81	6.60
	SD	(0.36)	(0.35)	(0.16)	(1.36)	(0.25)	(0.57)	(0.04)	(0.55)

CGY-05	Average	0.61	0.60	15.76	68.81	3.39	2.31	0.89	7.64
	SD	(0.23)	(0.01)	(0.14)	(0.21)	(0.06)	(0.29)	(0.04)	(0.18)
CGY-06	Average	0.56	0.86	15.39	68.87	3.68	3.00	0.84	6.80
	SD	(0.06)	(0.17)	(0.11)	(0.36)	(0.06)	(0.36)	(0.04)	(0.17)
CGY-07	Average	0.62	1.03	15.76	68.07	3.04	3.13	0.80	7.54
	SD	(0.12)	(0.08)	(0.35)	(0.16)	(0.09)	(0.14)	(0.01)	(0.23)
CGY-08	Average	0.48	0.84	16.34	67.43	3.15	3.17	0.98	7.60
	SD	(0.02)	(0.09)	(0.10)	(0.18)	(0.06)	(0.06)	(0.01)	(0.36)
CGY-09	Average	0.45	0.89	16.48	67.28	3.16	2.99	0.95	7.79
	SD	(0.06)	(0.14)	(0.17)	(0.11)	(0.05)	(0.16)	(0.05)	(0.11)
CGY-10	Average	0.57	0.88	16.20	66.19	3.43	3.39	1.03	8.32
	SD	(0.19)	(0.09)	(0.09)	(0.72)	(0.14)	(0.16)	(0.05)	(0.36)
CGY-11	Average	0.68	0.97	16.10	67.25	3.35	3.06	0.92	7.70
	SD	(0.16)	(0.09)	(0.24)	(0.32)	(0.17)	(0.09)	(0.00)	(0.20)
YZY-01	Average	0.56	1.62	17.09	65.79	3.54	3.23	1.22	6.94
	SD	(0.22)	(0.15)	(0.32)	(0.41)	(0.37)	(0.23)	(0.01)	(0.07)
YZY-05	Average	0.71	1.38	16.70	66.61	3.41	3.07	1.23	6.90
	SD	(0.18)	(0.04)	(0.26)	(0.53)	(0.18)	(0.09)	(0.01)	(0.10)
YZY-06	Average	0.47	1.07	17.49	67.09	3.31	2.12	1.21	7.25
	SD	(0.18)	(0.17)	(0.41)	(0.12)	(0.15)	(0.11)	(0.03)	(0.16)
YZY-07	Average	0.89	1.36	16.51	68.57	2.95	3.08	0.72	5.93
	SD	(0.18	(0.07)	(0.25)	(0.48)	(0.19)	(0.08)	(0.02)	(0.26)
YZY-08	Average	0.74	1.17	16.26	68.92	3.42	2.51	0.79	6.19
	SD	(0.34	(0.20)	(0.39)	(0.85)	(0.30)	(0.27)	(0.03)	(0.17)
YZY-09	Average	0.77	1.97	16.29	67.23	2.98	3.13	0.73	6.90
	SD	(0.16)	(0.14)	(0.24)	(0.09)	(0.15)	(0.20)	(0.00)	(0.24)
YZY-10	Average	0.79	1.20	16.66	68.22	3.05	2.70	0.82	6.57
	SD	(0.31)	(0.05)	(0.25)	(0.16)	(0.27)	(0.20)	(0.00)	(0.27)
YZY-11	Average	0.53	0.87	17.03	67.98	3.31	2.17	1.18	6.93

	SD	(0.28)	(0.18)	(0.64)	(0.38)	(0.24)	(0.16)	(0.04)	(0.07)
YZY-12	Average	0.84	1.53	16.51	67.95	2.96	2.73	0.78	6.71
	SD	(0.25)	(0.12)	(0.29)	(0.21)	(0.16)	(0.25)	(0.00)	(0.25)
YZY-13	Average	0.82	1.64	16.82	67.61	2.77	3.13	0.89	6.33
	SD	(0.19)	(0.17)	(0.25)	(0.15)	(0.21)	(0.12)	(0.04)	(0.10)
YG-01	Average	0.84	1.60	16.03	68.09	3.38	2.84	0.75	6.46
	SD	(0.16)	(0.24)	(0.34)	(0.18)	(0.17)	(0.17)	(0.00)	(0.22)
YG-02	Average	0.73	1.38	16.16	68.89	3.26	2.80	0.76	6.02
	SD	(0.20)	(0.28)	(0.33)	(0.70)	(0.09)	(0.25)	(0.08)	(0.42)
YG-03	Average	0.76	1.72	15.55	68.78	2.75	3.12	0.77	6.55
	SD	(0.28)	(0.15)	(0.40)	(0.44)	(0.39)	(0.29)	(0.03)	(0.59)
YG-04	Average	0.75	1.62	15.84	69.04	3.12	2.93	0.73	5.98
	SD	(0.22)	(0.05)	(0.27)	(0.30)	(0.17)	(0.10)	(0.03)	(0.16)
YG-05	Average	0.54	1.31	15.98	66.11	3.19	3.08	0.91	8.89
	SD	(0.25)	(0.02)	(0.05)	(0.27)	(0.01)	(0.02)	(0.01)	(0.08)
YG-06	Average	0.93	1.36	16.24	67.10	2.98	2.87	0.83	7.68
	SD	(0.33)	(0.23)	(0.33)	(0.70)	(0.10)	(0.14)	(0.07)	(0.45)
YG-07	Average	1.02	1.60	16.62	67.04	3.23	3.16	0.88	6.45
	SD	(0.11)	(0.32)	(0.34)	(0.23)	(0.27)	(0.07)	(0.04)	(0.27)
YG-08	Average	0.83	1.55	17.04	67.57	3.13	2.35	0.91	6.62
	SD	(0.28)	(0.21)	(0.22)	(0.34)	(0.13)	(0.20)	(0.01)	(0.33)
YG-09	Average	1.20	1.69	16.89	66.72	3.11	3.10	0.98	6.31
	SD	(0.30)	(0.12)	(0.26)	(0.24)	(0.21)	(0.13)	(0.07)	(0.38)
YG-10	Average	1.03	1.40	16.21	67.77	3.37	2.71	0.91	6.60
	SD	(0.22)	(0.13)	(0.30)	(0.80)	(0.20)	(0.14)	(0.03)	(0.27)
LSDD-01	Average	0.65	1.44	16.41	67.99	2.90	3.13	0.84	6.64
	SD	(0.18)	(0.17)	(0.34)	(0.16)	(0.34)	(0.06)	(0.01)	(0.32)
LSDD-02	Average	0.95	2.36	16.76	67.33	3.33	3.11	0.81	5.35
	SD	(0.21)	(0.21)	(0.30)	(0.32)	(0.19)	(0.11)	(0.00)	(0.13)

LSDD-03	Average	0.41	1.66	16.29	67.42	3.19	2.98	0.94	7.11
	SD	(0.13)	(0.16)	(0.04)	(0.28)	(0.02)	(0.09)	(0.02)	(0.20)
LSDD-04	Average	0.83	1.37	16.96	67.05	3.66	2.84	1.14	6.14
	SD	(0.27)	(0.19)	(0.41)	(0.16)	(0.24)	(0.16)	(0.09)	(0.14)
LSDD-05	Average	0.46	1.10	16.89	67.13	3.13	3.38	1.07	6.84
	SD	(0.20)	(0.10)	(0.53)	(0.23)	(0.11)	(0.11)	(0.07)	(0.27)
LSDD-06	Average	0.54	1.41	17.31	66.88	3.17	3.03	0.96	6.70
	SD	(0.29)	(0.35)	(0.08)	(0.22)	(0.03)	(0.43)	(0.12)	(0.09)
LSDD-07	Average	0.88	1.42	16.85	67.19	2.98	3.18	0.97	6.53
	SD	(0.27)	(0.30)	(0.52)	(0.60)	(0.22)	(0.17)	(0.10)	(0.07)
LSDD-08	Average	0.92	1.87	16.16	68.47	2.54	3.02	0.90	6.13
	SD	(0.18)	(0.20)	(0.26)	(0.48)	(0.27)	(0.20)	(0.04)	(0.15)
LSDD-09	Average	0.40	1.85	16.30	68.13	3.20	2.46	0.56	7.12
	SD	(0.17)	(0.30)	(0.33)	(0.11)	(0.13)	(0.18)	(0.32)	(0.21)
LSDD-10	Average	0.83	1.47	15.98	68.89	3.32	2.83	0.81	5.86
	SD	(0.22)	(0.34)	(0.35)	(0.55)	(0.12)	(0.40)	(0.04)	(0.30)
LSDD-11	Average	0.62	0.69	16.27	67.42	3.21	3.06	0.95	7.76
	SD	(0.24)	(0.12)	(0.11)	(0.71)	(0.13)	(0.13)	(0.03)	(0.20)
LSDD-12	Average	0.97	1.50	16.86	68.00	2.98	2.96	0.80	5.94
	SD	(0.12)	(0.14)	(0.59)	(0.46)	(0.10)	(0.35)	(0.01)	(0.23)
LHP-01	Average	0.44	1.38	15.46	63.53	4.00	4.39	0.68	10.10
	SD	(0.12)	(0.09)	(0.04)	(1.84)	(0.05)	(0.07)	(0.01)	(0.31)
LHP-02	Average	0.33	2.12	16.54	63.05	3.22	4.24	0.56	9.59
	SD	(0.06)	(0.55)	(0.24)	(0.12)	(0.33)	(0.19)	(0.04)	(0.30)
LHP-03	Average	1.20	1.26	16.30	64.47	3.07	4.32	0.54	8.84
	SD	(0.16)	(0.35)	(0.31)	(0.25)	(0.15)	(0.11)	(0.05)	(0.27)
LHP-04	Average	0.97	1.56	16.62	64.43	3.46	3.63	0.84	8.49
	SD	(0.39)	(0.09)	(0.51)	(0.25)	(0.22)	(0.40)	(0.03)	(0.14)
LHP-05	Average	1.01	2.12	15.00	64.11	4.39	4.52	0.66	8.19

	SD	(0.17)	(0.23)	(0.34)	(0.28)	(0.16)	(0.24)	(0.12)	(0.23)