The relationship between local structure and photo-Fenton catalytic ability of glasses and glass-ceramics prepared from Japanese slag

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Table 1 Fe_2O_3 (batch) content and bandgap energy of heat-treated slag samples calculated from DRS

Sample	**Total Fe_2O_3 content (mass %)**	**E_g (eV)**
SF11 Original	11.45 ± 0.01	2.15 ± 0.02
SF11 Melted	11.45 ± 0.01	2.09 ± 0.02
RSF14 Melted	14.40 ± 0.01	2.22 ± 0.04
SF30 Melted	30.00 ± 0.01	1.96 ± 0.01
SF50 Melted	50.00 ± 0.01	1.96 ± 0.01

Table 2 ^{57}Fe-Mössbauer parameters at room temperature of slag glass samples before and after heat treatment at 800 °C for 100 min

	Sample	assignment	*A* (%)	*δ* (mm s^{-1})	*Δ* (mm s^{-1})	*H*int (T)	*Γ* (mm s^{-1})
Before	SF50 Melted	mag + mgh	32.2	0.30 ± 0.01	-0.02 ± 0.02	48.10 ± 0.01	0.42 ± 0.03
		mag.	34.4	0.52 ± 0.02	0.00	44.80 ± 0.02	0.88 ± 0.10
		Fe^{III} T_d	23.6	0.27 ± 0.02	1.21 ± 0.03	-	0.84 ± 0.05
		hem.	9.8	0.37 ± 0.03	-0.20 ± 0.01	49.96 ± 0.02	0.43 ± 0.04
	SF30 Melted	Fe^{III} O_h	100.0	0.40 ± 0.01	0.89 ± 0.02	-	0.99 ± 0.03
	RSF14 Melted	Fe^{III} T_d	100.0	0.31 ± 0.01	1.25 ±0.02	-	0.69 ± 0.02
	SF11 Melted	Fe^{III} T_d	100.0	0.33 ± 0.01	1.25 ± 0.01	-	0.69 ± 0.02
	SF11 Original	Fe^{II} T_d	85.5	1.00 ± 0.01	1.89 ± 0.02	-	0.63 ± 0.02
		Fe^{III} O_h	14.5	0.50 ± 0.02	1.16 ± 0.08	-	0.51 ± 0.10
After	SF50 Melted	Fe^{III} T_d	25.5	0.31 ± 0.03	1.14 ± 0.01	-	0.89 ± 0.01
		hem.	38.1	0.37 ± 0.01	-0.18 ± 0.04	51.40 ± 0.01	0.34 ± 0.03
		mgh.	36.4	0.37 ± 0.01	-0.02 ± 0.01	46.40 ± 0.01	1.23 ± 0.02
	SF30 Melted	Fe^{III} T_d	100.0	0.32 ± 0.02	0.84 ± 0.03	-	0.76 ± 0.01
	RSF14 Melted	Fe^{III} T_d	100.0	0.18 ± 0.01	1.34 ± 0.01	-	0.78 ± 0.01
	SF11 Melted	Fe^{III} O_h	100.0	0.38 ± 0.04	0.92 ± 0.01	-	0.63 ± 0.01
	SF11 Original	Fe^{II} O_h	9.8	1.10 ± 0.02	2.25 ± 0.05	-	0.44 ± 0.06
		Fe^{III} O_h	90.2	0.37 ± 0.01	0.88 ± 0.01	-	0.75 ± 0.01

hem.: Hematite, mag.: Magnetite, mgh.: Maghemite, T_d: Tetrahedra, O_h: Octahedra, *A*: Absorption area,

δ: Isomer shift, *Δ*: Quadrupole splitting, H_{int}: Internal magnetic field, *Γ*: Line width.

Table 3 ^{57}Fe-Mössbauer parameters at 77 K of slag samples heat-treated at 800 ^{o}C for 100 min

sample	assignment	A (%)	δ (mm s^{-1})	Δ (mm s^{-1})	H_{int} (T)	Γ (mm s^{-1})
SF50 Melted	Fe^{III} T_d	14.1	0.40 $\pm$ 0.02	1.31 $\pm$ 0.03	-	0.92 $\pm$ 0.05
	hem.	49.0	0.48 $\pm$ 0.01	0.13 $\pm$ 0.01	53.50 $\pm$ 0.01	0.37 $\pm$ 0.01
	mgh.	36.9	0.43 $\pm$ 0.01	-0.11 $\pm$ 0.01	50.40 $\pm$ 0.08	0.71 $\pm$ 0.02
SF30 Melted	Fe^{III} T_d	15.6	0.41 $\pm$ 0.02	1.50 $\pm$ 0.03	-	1.05 $\pm$ 0.05
	Mag + mgh	27.9	0.40 $\pm$ 0.03	-0.08 $\pm$ 0.05	41.90 $\pm$ 0.40	1.40 $\pm$ 0.10
	hem.	28.1	0.48 $\pm$ 0.01	0.01 $\pm$ 0.01	50.20 $\pm$ 0.10	0.65 $\pm$ 0.04
	mag.	28.4	0.42 $\pm$ 0.01	-0.04 $\pm$ 0.02	46.80 $\pm$ 0.10	0.73 $\pm$ 0.07
RSF14 Melted	Fe^{III} T_d	58.5	0.29 $\pm$ 0.01	0.96 $\pm$ 0.01	-	0.46 $\pm$ 0.01
	Fe^{III} T_d	41.5	0.24 $\pm$ 0.01	1.90 $\pm$ 0.01	-	0.40 $\pm$ 0.02
SF11 Melted	Fe^{III} O_h	50.0	0.58 $\pm$ 0.01	1.09 $\pm$ 0.01	-	0.46 $\pm$ 0.03
	Fe^{III} T_d	50.0	0.32 $\pm$ 0.02	1.21 $\pm$ 0.02	-	0.50 $\pm$ 0.03
SF11 Original	Fe^{III} T_d	100.0	0.42 $\pm$ 0.01	1.20 $\pm$ 0.01	-	1.03 $\pm$ 0.03

hem.: Hematite, mag.: Magnetite, mgh.: Maghemite, T_d: Tetrahedra, O_h: Octahedra, A: Absorption area, δ: Isomer shift, Δ: Quadrupole splitting, H_{int}: Internal magnetic field, Γ: Line width.