Prospects and challenges of iron pyroelectrolysis in magnesium aluminosilicate melts near minimum liquidus temperature

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Electronic Supplementary Information

Table S1 – Gibbs free energies of reduction of silica to silicon oxide or silicon.

Reaction	ΔG (kJ)	V_o=ΔG/(nF) (V)
$2SiO_2$ (l) = O_2 (g) + 2SiO (l)	540	1.34
$2SiO_2$ (l) = O_2 (g) + 2SiO (g)	709	1.78
SiO_2 (l) = O_2 (g) + Si (l)	586	1.46
SiO_2 (s) = O_2 (g) + Si (l)	601	1.50
$2/3Al_2O_3$ (s) = O_2 (g) + 4/3Al (l)	750	1.88

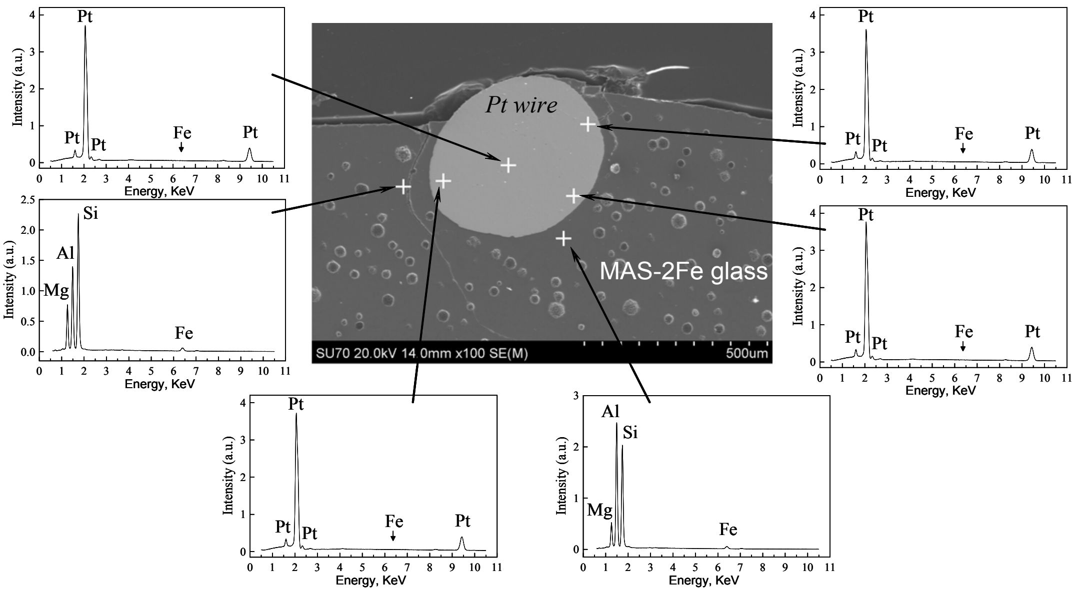

Figure S1 – Post-mortem EDS analysis at representative locations in the Pt wire, after contacting with molten MAS-2Fe glass at 1728 K for 5 h without electrical polarization.

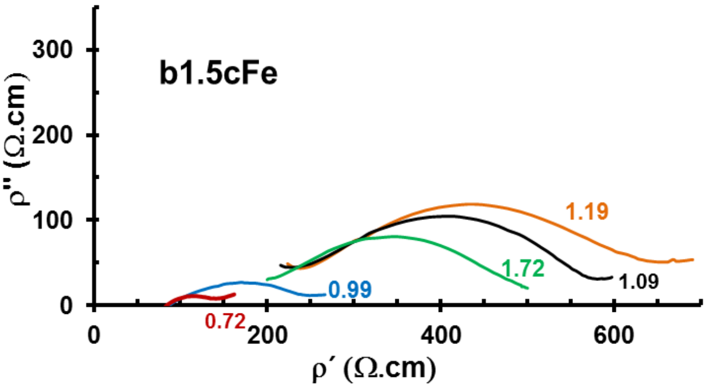

Figure S2 – Complex resistivity spectra for b1.5cFe cell, obtained after relative charging Q/Q_{Fe}=0.72, 0.99, 1.09, 1.19 and 1.72, where Q_{Fe} denotes the charge required to reduce the actual content of iron oxide to metallic Fe, assuming that Fe^{2+} prevails.

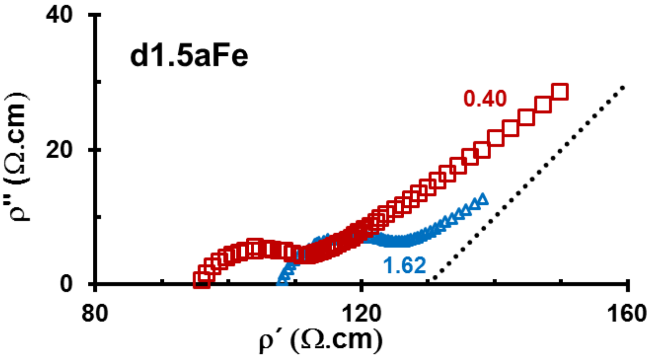

Figure S3 – Complex resistivity spectra for d1.5aFe cell, obtained at relative charging Q/Q_{Fe}=0.40 and 1.62, where Q_{Fe} denotes the charge required to reduce the actual content of iron oxide to metallic Fe, assuming that Fe^{2+} prevails.

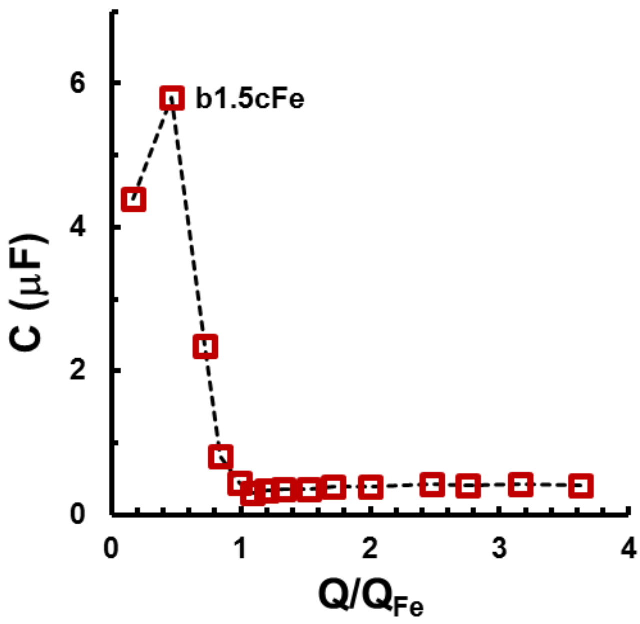

Figure S4 – Dependence of interfacial capacitance of b1.5cFe cell on relative charging Q/Q_{Fe}, where Q_{Fe} denotes the charge required to reduce the actual content of iron oxide to metallic Fe, assuming that Fe^{2+} prevails.