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Supporting Information

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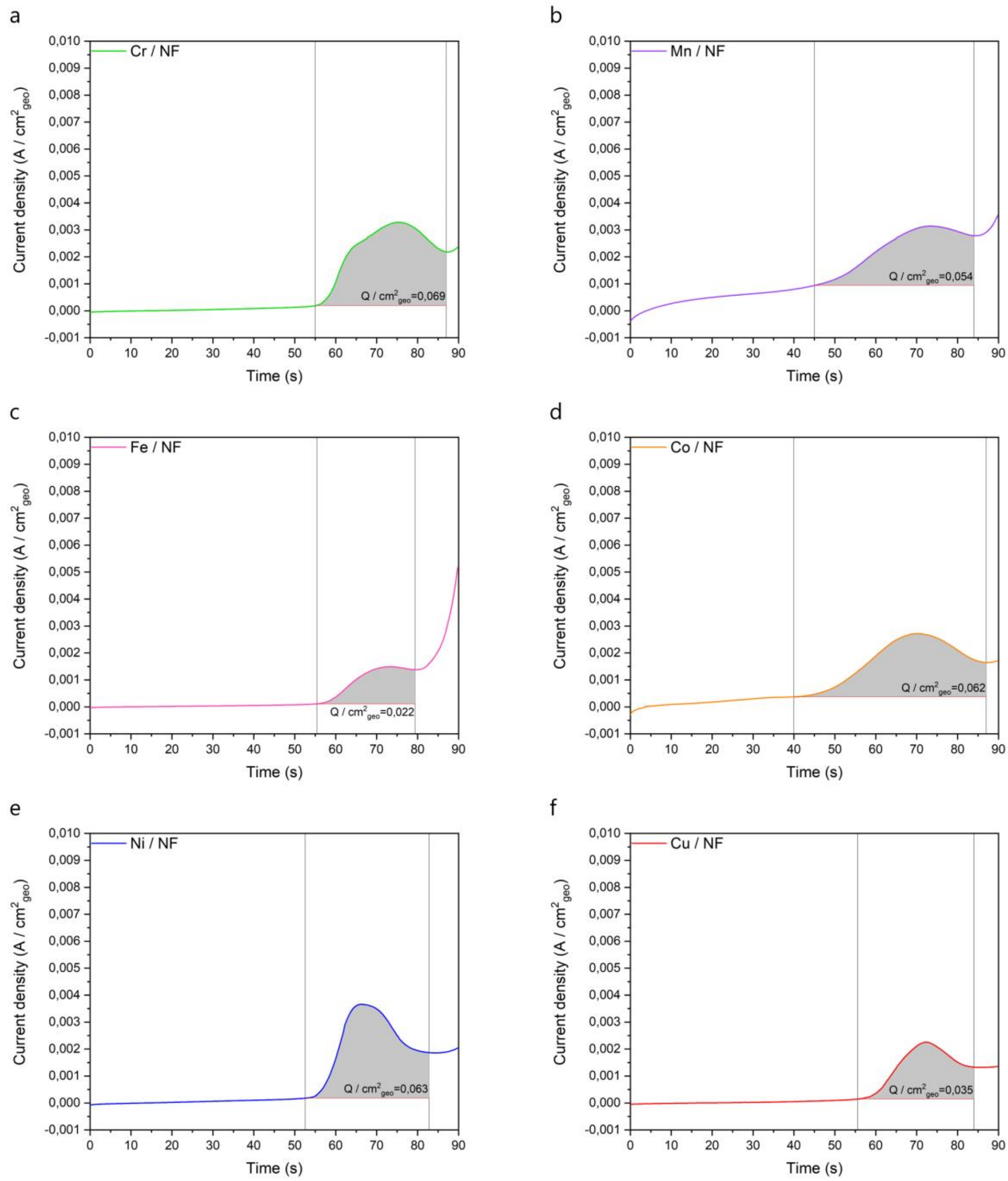

Figure S1. Integration of the nickel oxidation peak of the forward scan of the plated electrodes in 1 M KOH, showing the amount of active nickel species (Q/cm$^2_{geo}$). A separated cell with a Fumasep FAA-3-50 membrane, a platinum counter electrode and a saturated calomel reference electrode were used. Scans were taken from 0 V vs SCE to 0.45 V vs SCE at 5 mV/sec. (a) Cr/NF, (b) Mn/NF, (c) Fe/NF, (d) Co/NF, (e) Ni/NF and (f) Cu/NF.

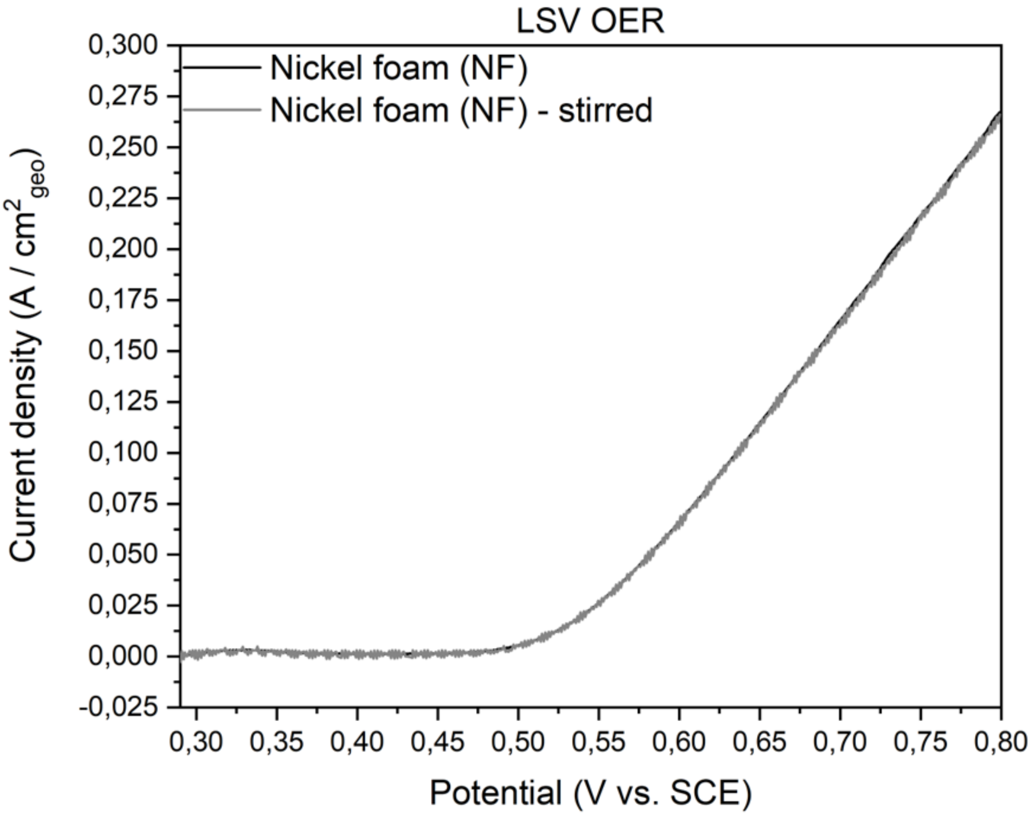

Figure S2. Stirred vs unstirred LSVs of bare nickel foam in 1 M KOH. A separated cell with a Fumasep FAA-3-50 membrane, a platinum counter electrode and a saturated calomel reference electrode were used. Scans were taken from 0.25 V vs SCE to 0.8 V vs SCE at 20 mV/sec.

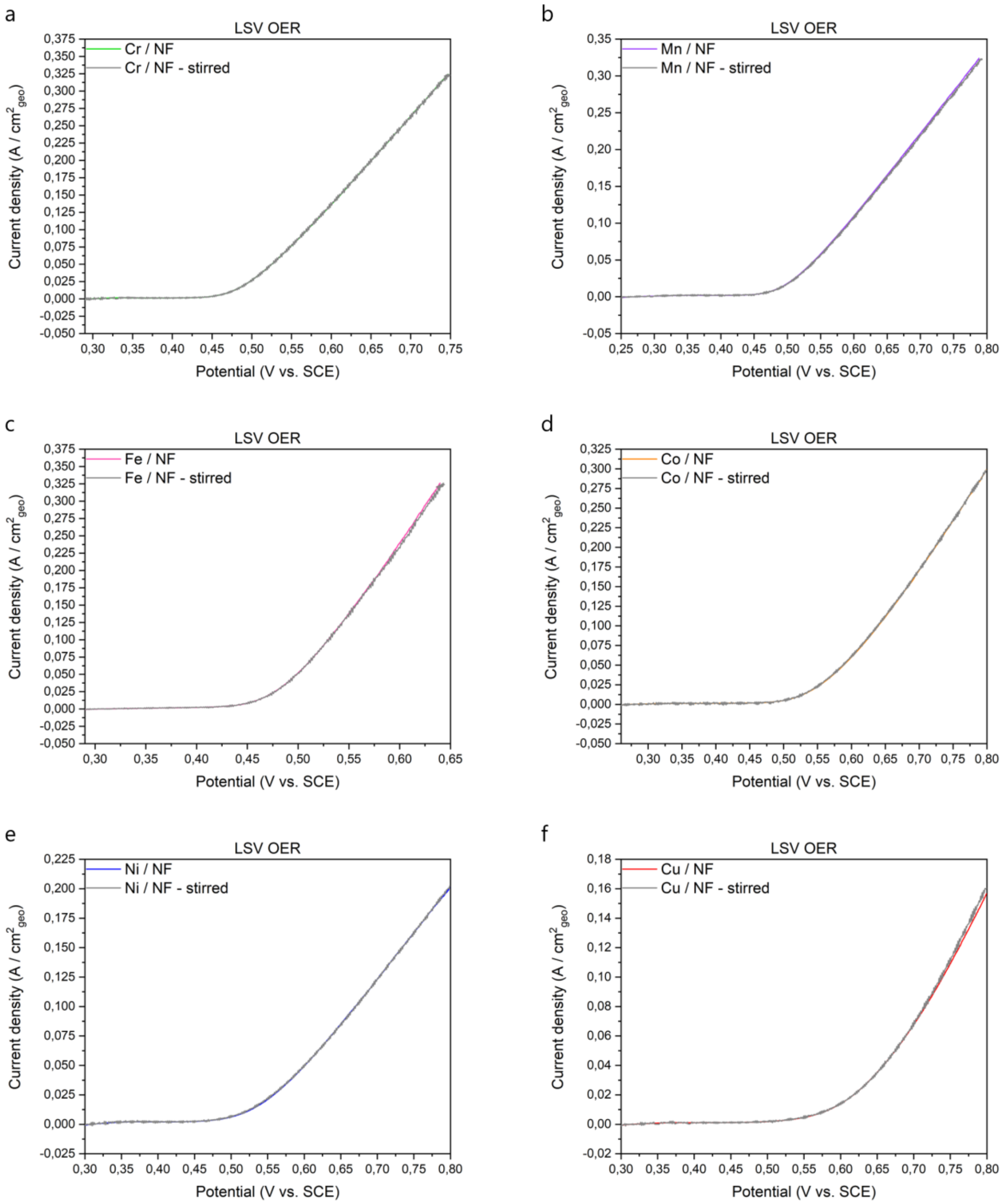

Figure S3. Stirred vs unstirred LSVs of all plated electrodes in 1 M KOH. A separated cell with a Fumasep FAA-3-50 membrane, a platinum counter electrode and a saturated calomel reference electrode were used. Scans were taken from 0.25 V vs SCE to 0.8 V vs SCE at 20 mV/sec. (a) Cr/NF, (b) Mn/NF, (c) Fe/NF, (d) Co/NF, (e) Ni/NF and (f) Cu/NF.

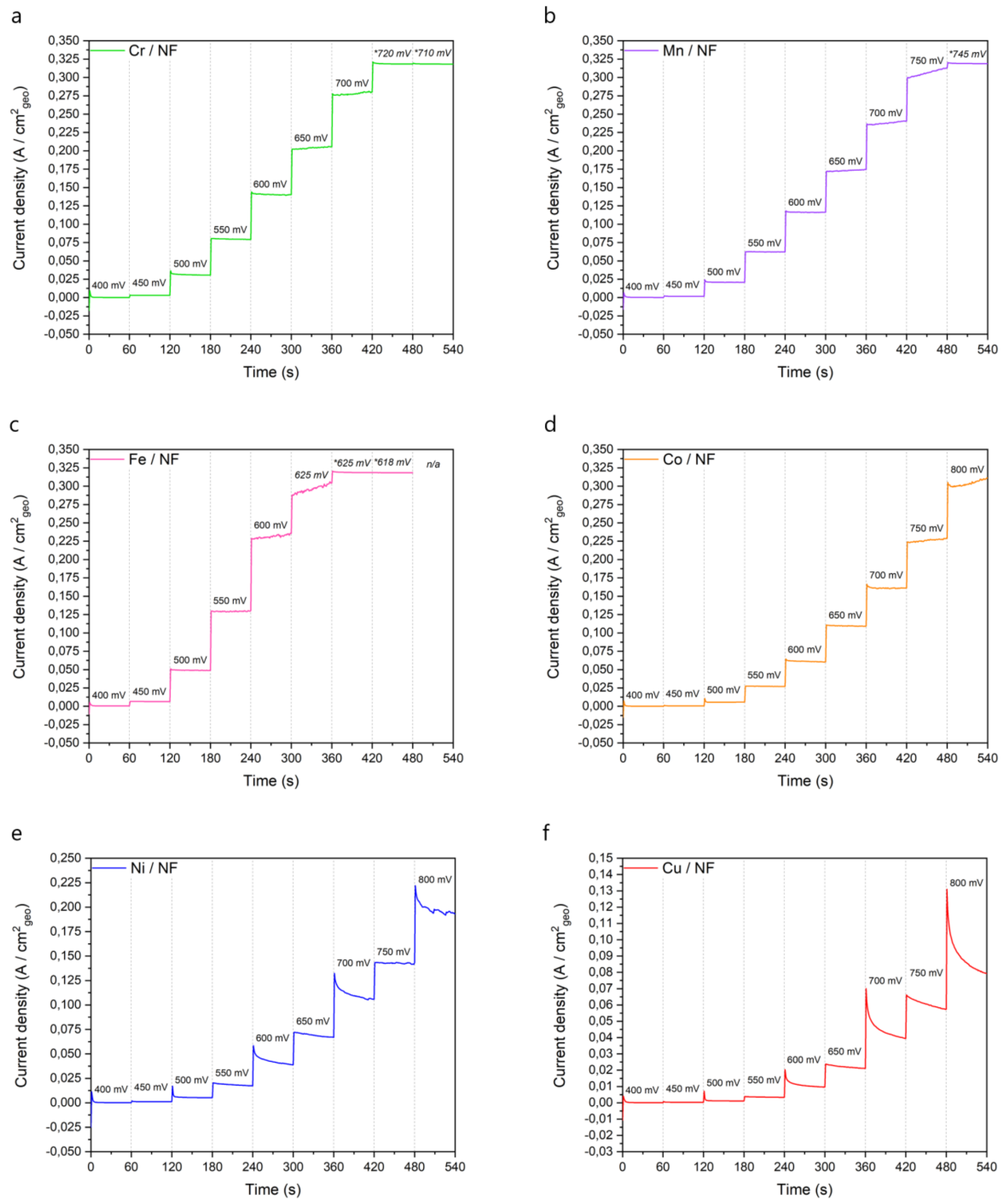

Figure S4. Chronoamperometry method to obtain LSV-like data from a discharged system for all plated electrodes. CA was run at room temperature from 400 to 800 mV vs. SCE with steps of 50 mV. A separated cell was used with a Fumasep FAA-3-50 membrane, a platinum counter electrode and a saturated calomel reference electrode. A potential was held for 1 minute to allow for the discharge of the system. At higher potentials, a noisy signal is seen, this is because a lot of oxygen is generated at the electrode surface. (a) Cr/NF, (b) Mn/NF, (c) Fe/NF, (d) Co/NF, (e) Ni/NF and (f) Cu/NF. Measurements indicated with "*" show currents above the limit of the potentiostat and are therefore unreliable.

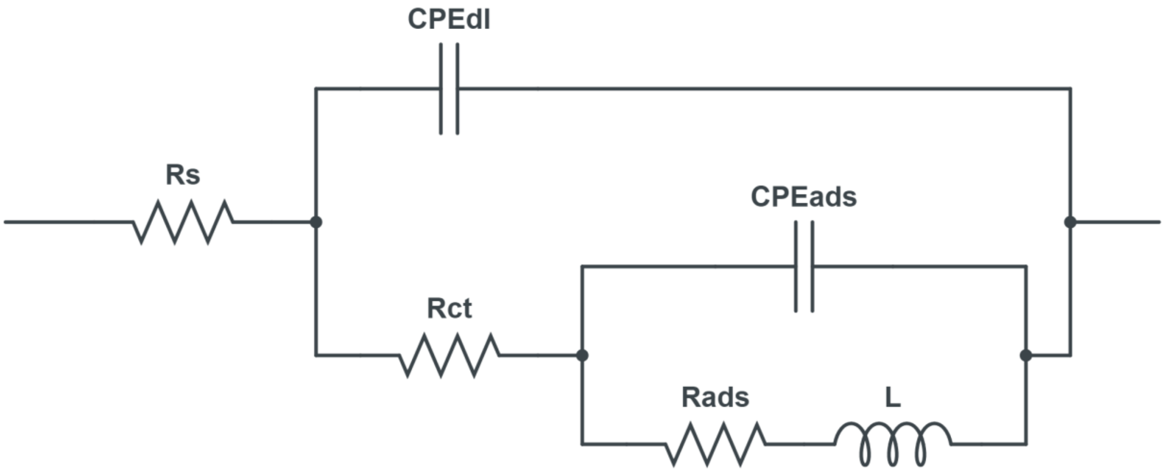

Figure S5. Equivalent circuit used for EIS data fitting, where R_s is the solution resistance, R_{ct} the charge transfer resistance, CPE_{dl} is a constant phase element corresponding to the double layer capacitance. CPE_{ads} and R_{ads} are related to the adsorption of reactants and L is an inductor.

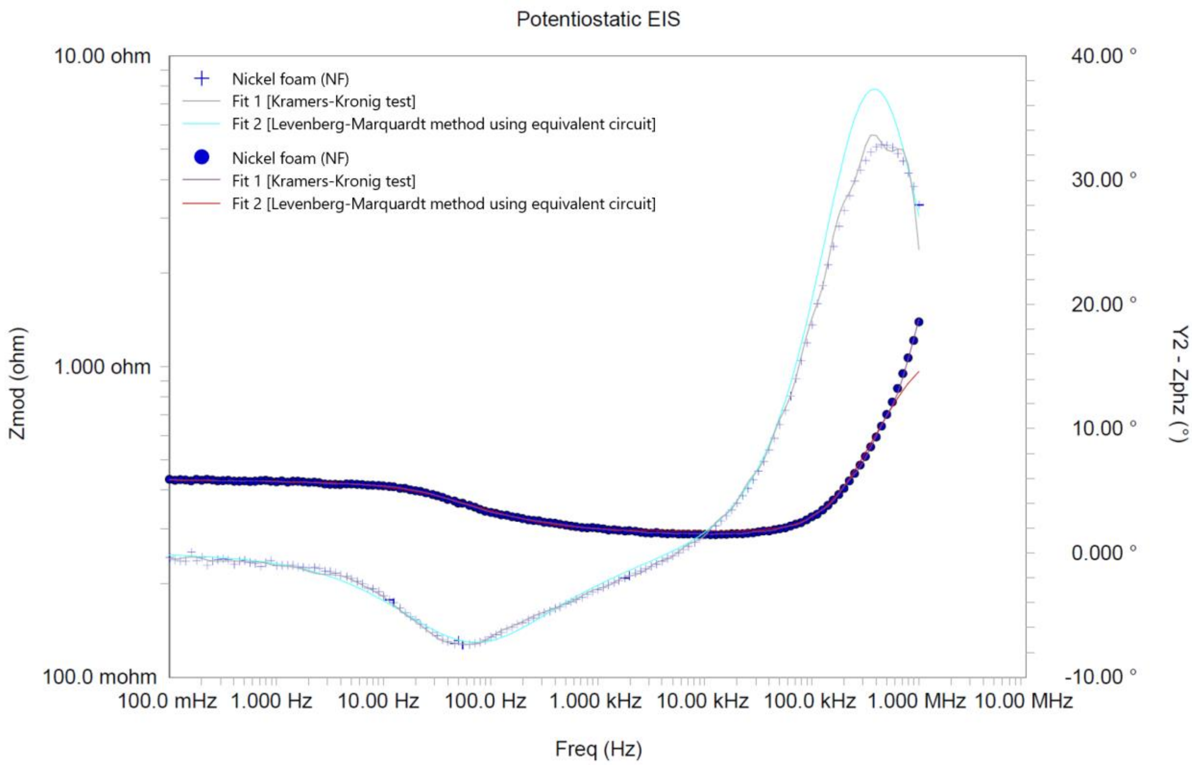

Figure S6. Bode diagram of cleaned nickel foam with Kramers-Kronig ($\chi^2 = 96.4 \cdot 10^{-6}$) and Levenberg-Marquardt method fitting ($\chi^2 = 2.2 \cdot 10^{-3}$).

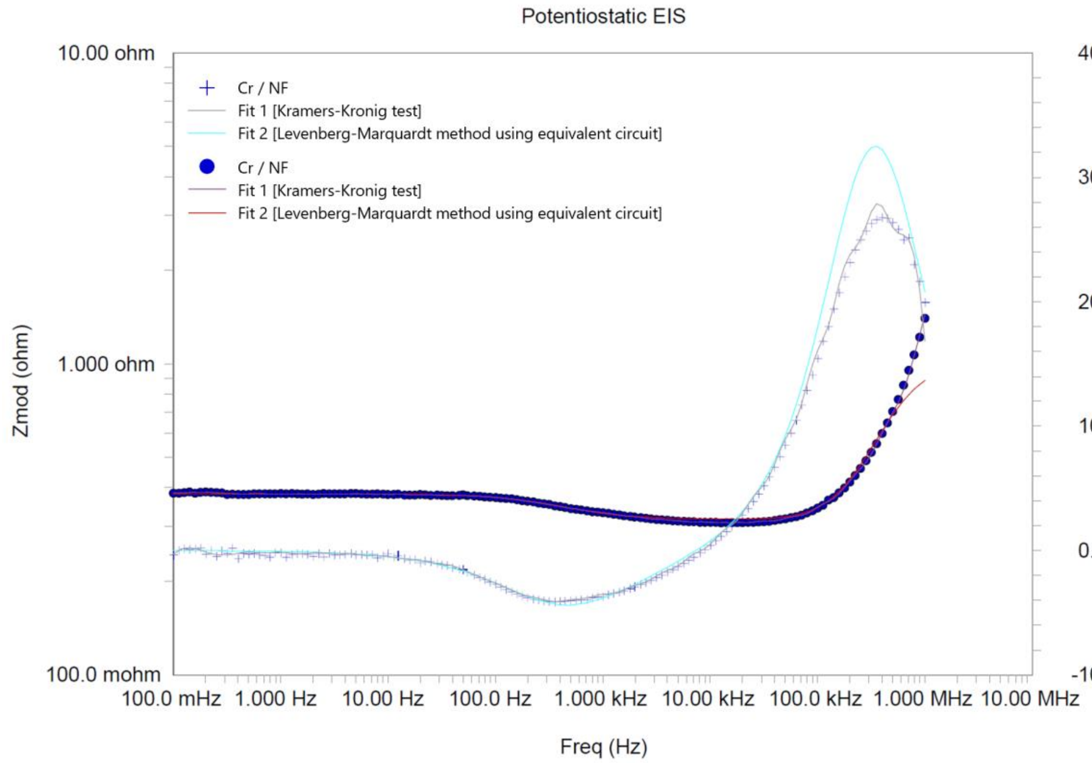

Figure S7. Bode diagram of Cr/NF with Kramers-Kronig ($\chi^2 = 85.3 \cdot 10^{-6}$) and Levenberg-Marquardt method fitting ($\chi^2 = 3.3 \cdot 10^{-3}$).

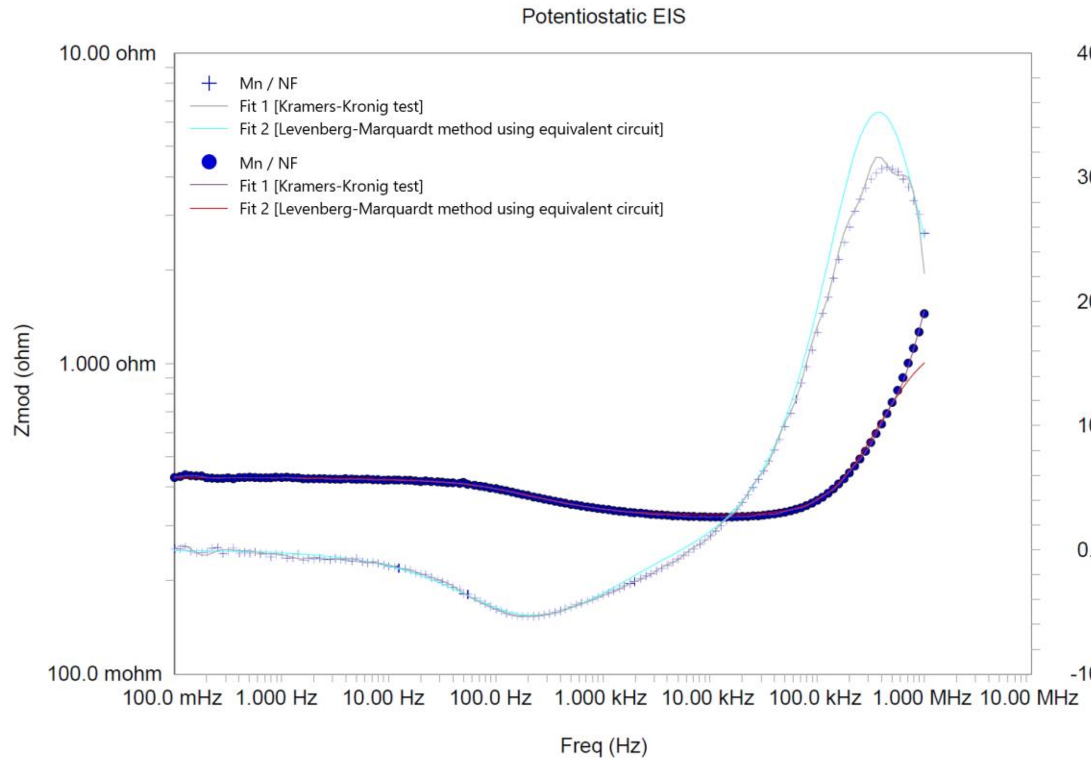

Figure S8. Bode diagram of Mn/NF with Kramers-Kronig ($\chi^2 = 74.8 \cdot 10^{-6}$) and Levenberg-Marquardt method fitting ($\chi^2 = 2.1 \cdot 10^{-3}$).

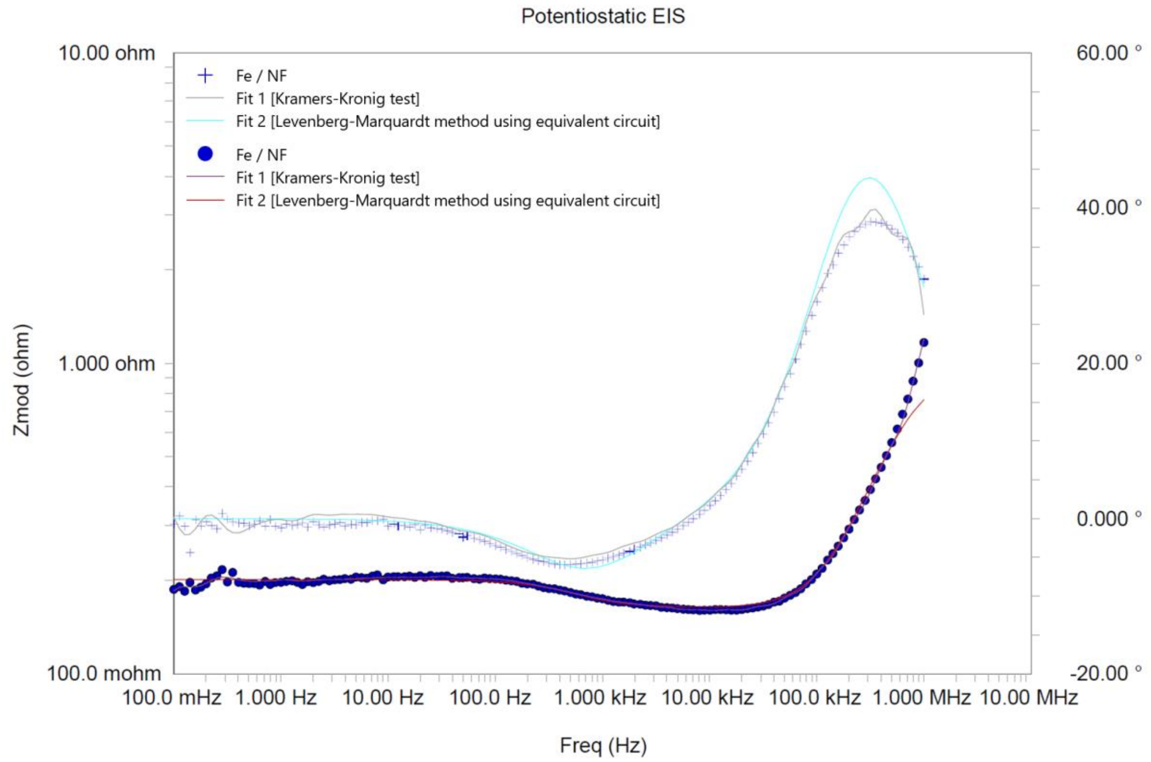

Figure S9. Bode diagram of Fe/NF with Kramers-Kronig (χ^2 = 447.1·10^{-6}) and Levenberg-Marquardt method fitting (χ^2 = 3.4·10^{-3}).

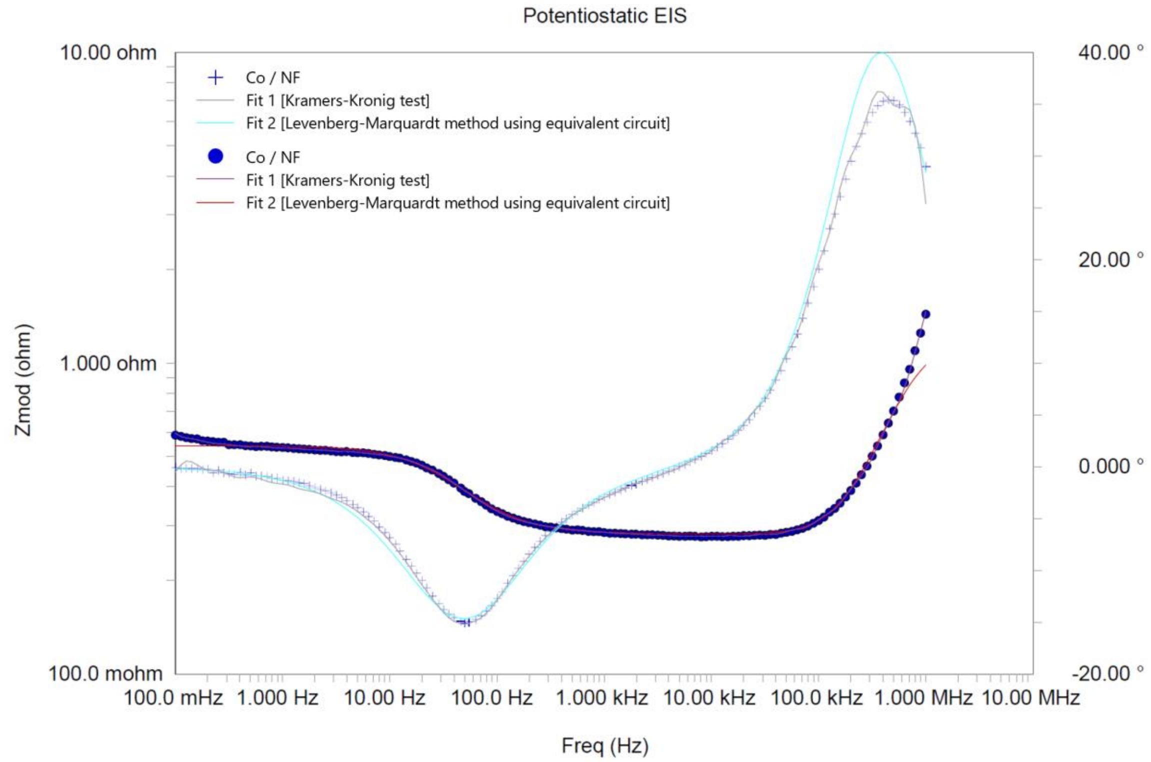

Figure S10. Bode diagram of Co/NF with Kramers-Kronig (χ^2 = 112.2·10^{-6}) and Levenberg-Marquardt method fitting (χ^2 = 2.5·10^{-3}).

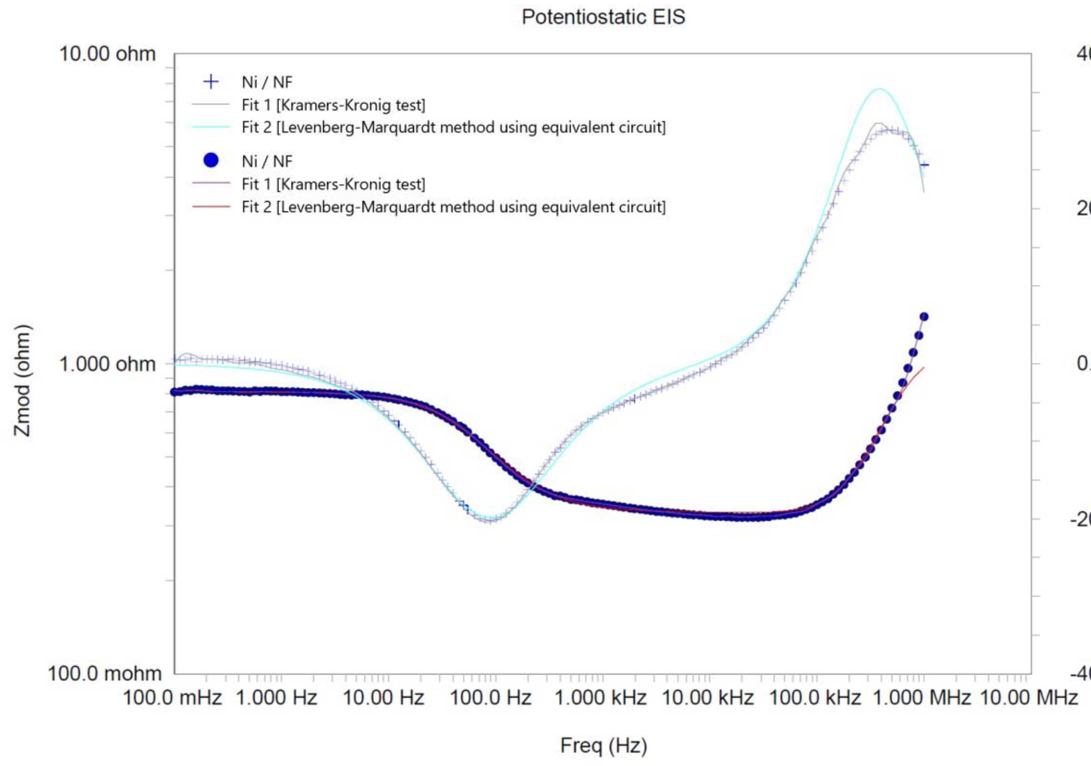

Figure S11. Bode diagram of Ni/NF with Kramers-Kronig (χ^2 = 119.9·10^{-6}) and Levenberg-Marquardt method fitting (χ^2 = 2.5·10^{-3}).

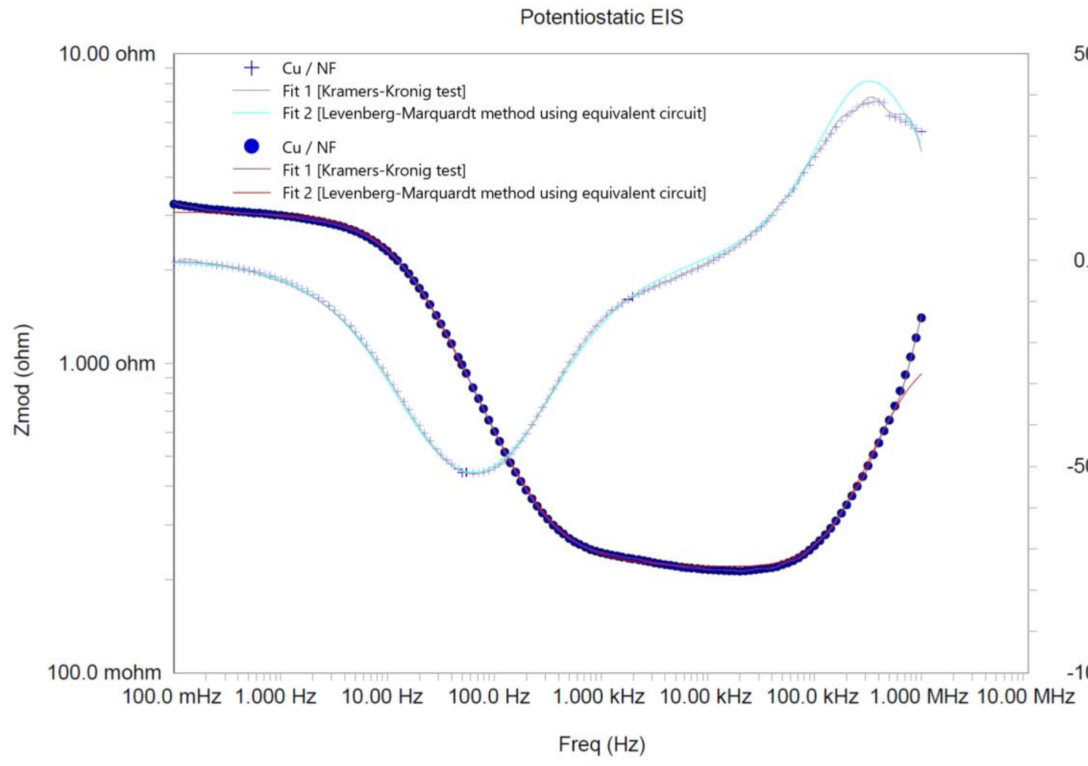

Figure S12. Bode diagram of Cu/NF with Kramers-Kronig (χ^2 = 167.7·10^{-6}) and Levenberg-Marquardt method fitting (χ^2 = 2.9·10^{-3}).