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Supplementary Information for:

Thermally-Stable Dynamic Windows based on Reversible Metal Electrodeposition from Aqueous Electrolytes

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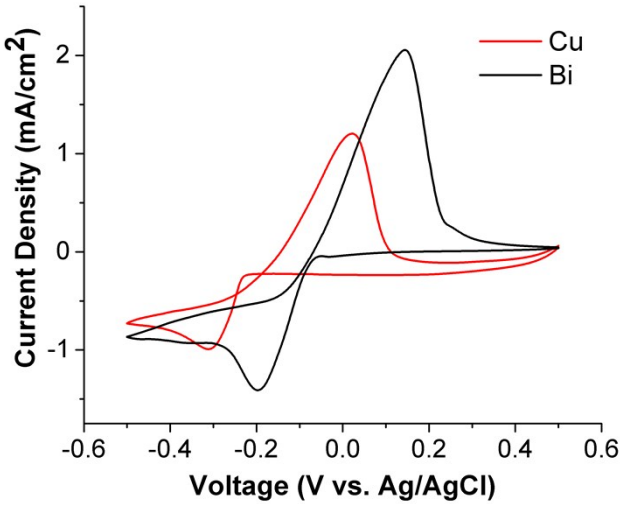

Figure S1: Cyclic voltammograms in 60:40 vol % methanol:H_2O in an electrolyte containing only Cu (red) and only Bi (black) as the electroactive metal using a Pt-modified ITO on glass working electrode at a scan rate of 20 mV/s.

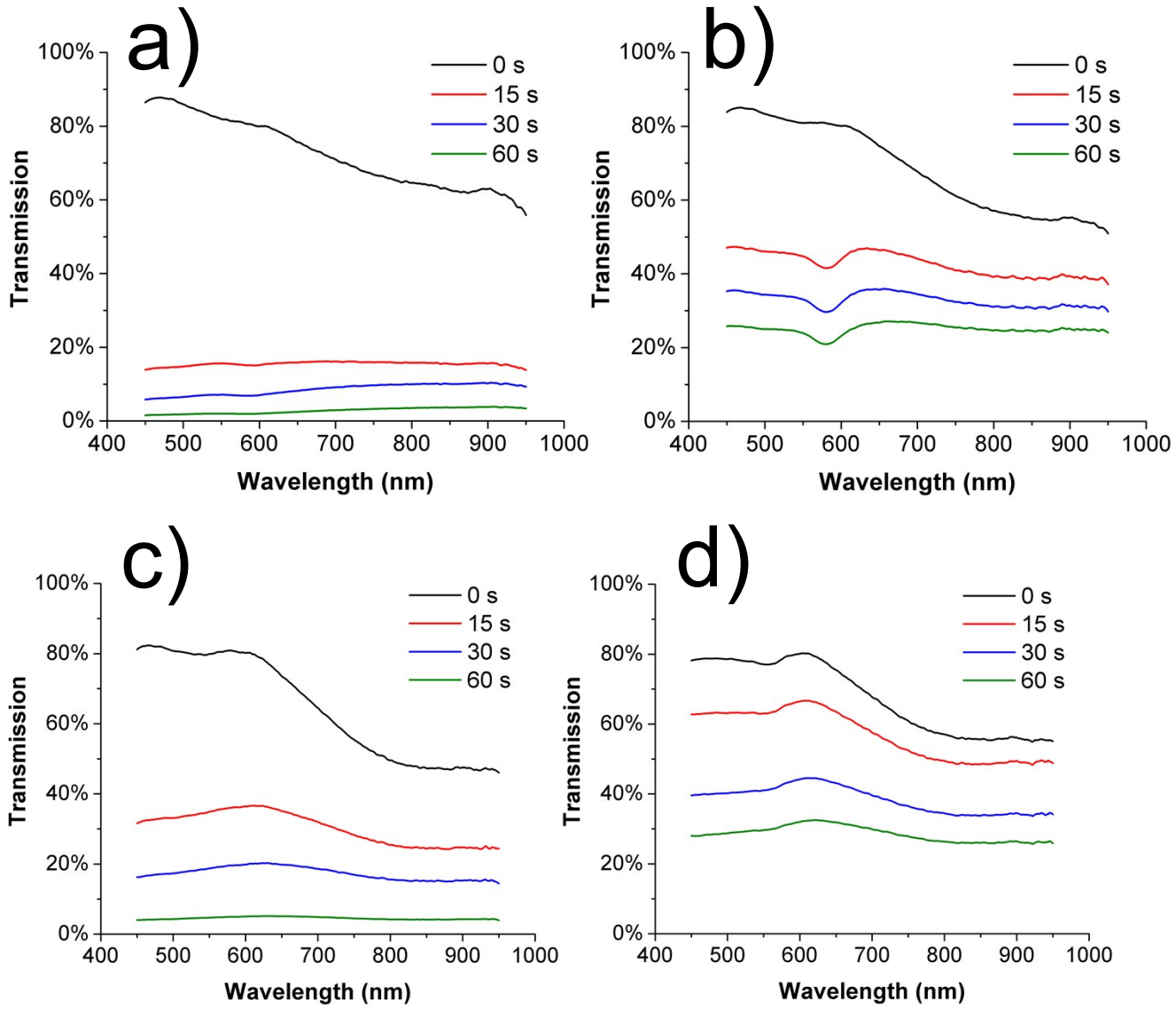

Figure S2: Transmission of 25 cm^2 dynamic windows during 60 s of metal electrodeposition at -0.6 V using the Cu-Bi electrolyte in H_2O (a), 60:40 vol % ethylene glycol:H_2O (b), 60:40 vol % methanol:H_2O (c), and 60:40 vol % glycerol:H_2O (d).

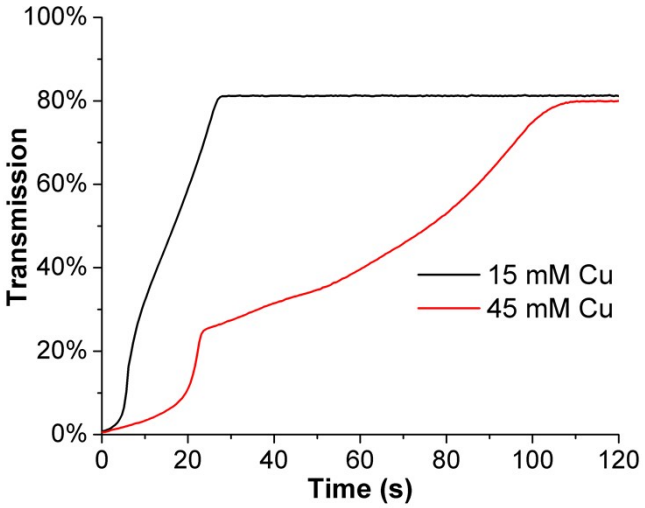

Figure S3: Transmission at 600 nm of 25 cm^2 dynamic windows at 60°C after 60 s of metal electrodeposition at -0.6 V during the metal stripping process at +0.6 V using the Cu-Bi electrolyte in H_2O with 15 mM Cu^{2+} (black) and 45 mM Cu^{2+} (red).

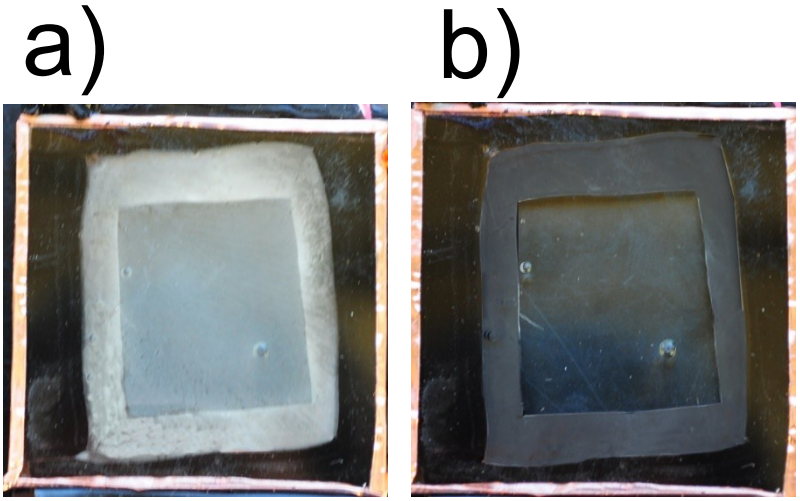

Figure S4: Photographs of a 25 cm^2 dynamic window on a black background using the Cu-Bi electrolyte in H_2O with 45 mM Cu^{2+} after 60 s of metal electrodeposition at -0.6 V during the metal stripping process at +0.6 V after 20 s (a) and 120 s (b). The formation of a white haze during metal stripping is caused by insoluble CuBr precipitate.

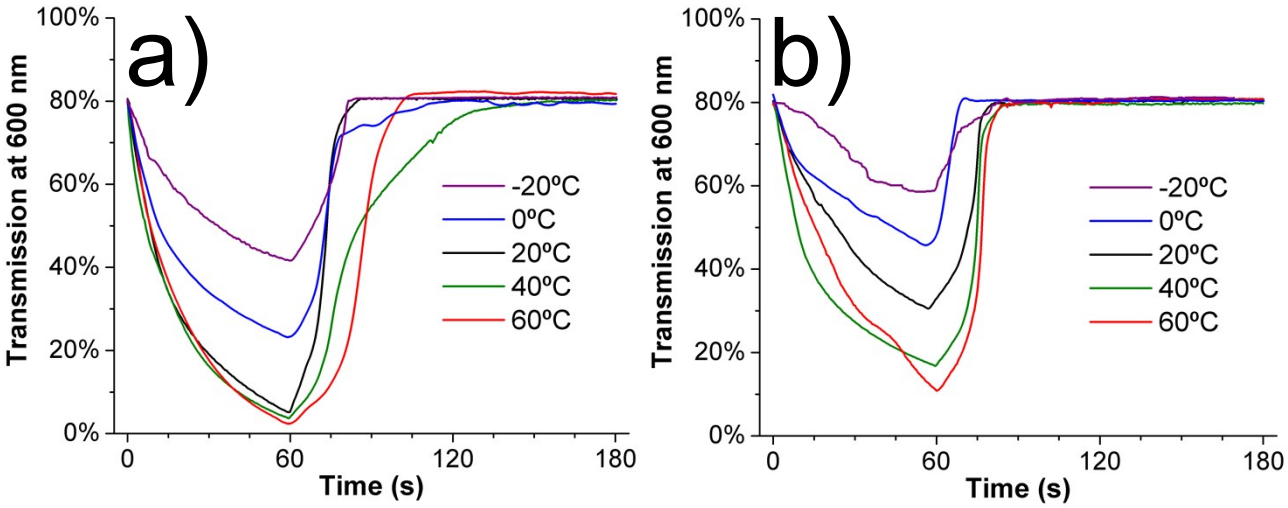

Figure S5: Transmission of 25 cm^2 dynamic windows at different temperatures during 60 s of metal electrodeposition at -0.6 V followed by 120 s of metal stripping at +0.6 V using the Cu-Bi electrolyte in 60:40 vol % methanol:H_2O (a) and in 60:40 vol % glycerol:H_2O (b).

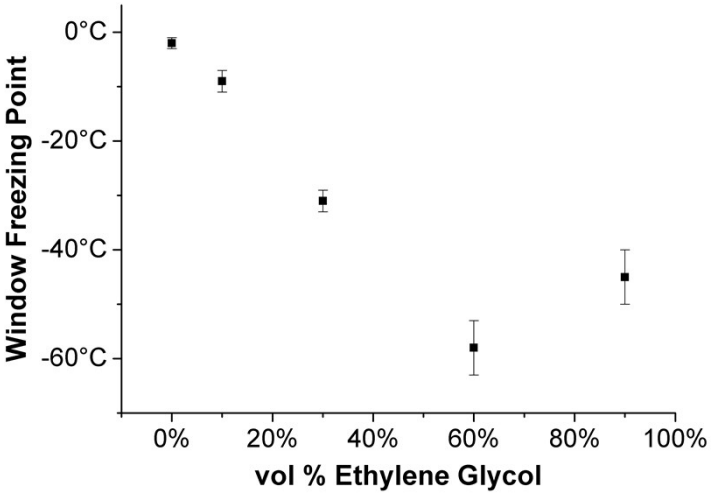

Figure S6: Freezing point of windows containing the Cu-Bi electrolyte in ethylene glycol and water as a function of vol % of ethylene glycol.

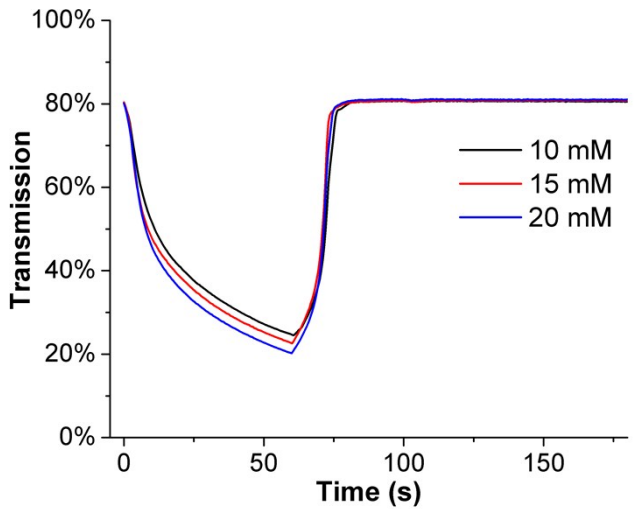

Figure S7: Transmission at 600 nm of 25 cm^2 dynamic windows during 60 s of metal electrodeposition at -0.6 V followed by 120 s of metal stripping at +0.6 V using the Cu-Bi electrolyte in 60:40 vol % ethylene glycol:H_2O with 10 mM Cu^{2+} (black), 15 mM Cu^{2+} (red), and 20 mM Cu^{2+} (blue).

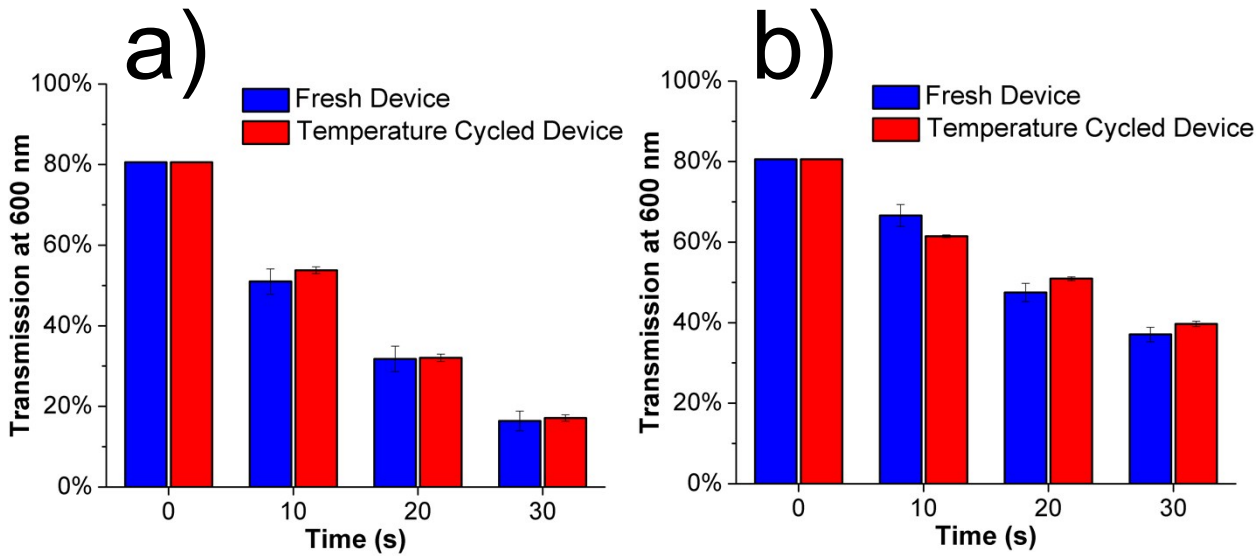

Figure S8: Full-area transmission measurements at 600 nm of 25 cm^2 dynamic windows at 20°C with the Cu-Bi electrolyte containing H_2O (a) and 60:40 vol% ethylene glycol:H_2O (b) as a function of metal electrodeposition time at -0.6 V. The blue bars represent the transmission of freshly-constructed windows while the red bars represent windows that had previously been switched at -20°C (only for the window with ethylene glycol), 0°C, 20°C, 40°C, and 60°C. The error bars in the plots represent one standard deviation of measured transmission across the entire electrode area and are a measure of the uniformity of window switching. The uniformity of the windows are not adversely affected by the temperature cycling.

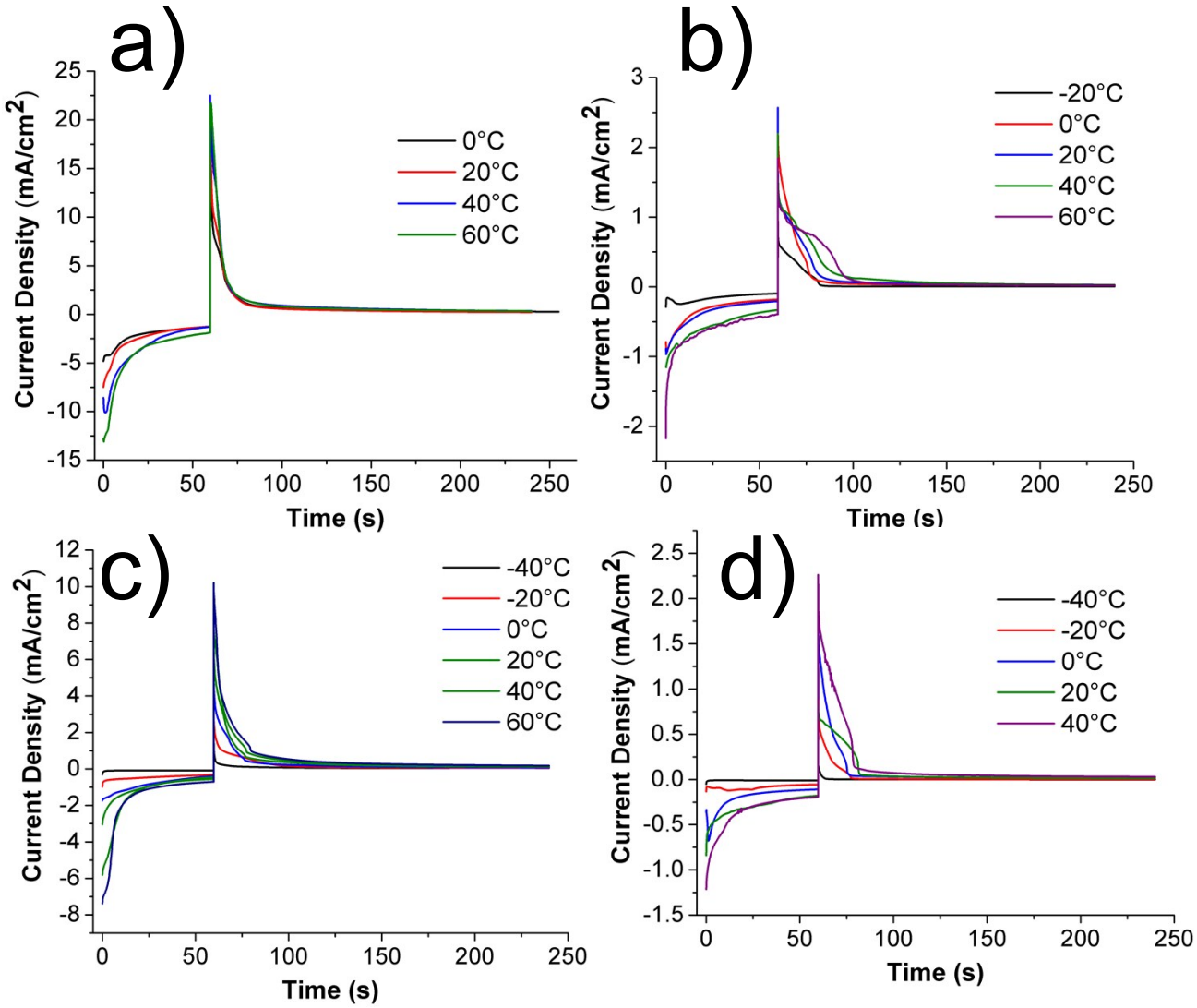

Figure S9: Chronoamperometry at different temperatures during switching of 25 cm^2 dynamic windows at -0.6 V for 60 s to induce metal electrodeposition followed by +0.6 V for 180 s to induce metal stripping with the Cu-Bi electrolyte containing H_2O (a), 60:40 vol % methanol:H_2O (b), 60:40 vol % ethylene glycol:H_2O (c) and in 60:40 vol % glycerol:H_2O (d).

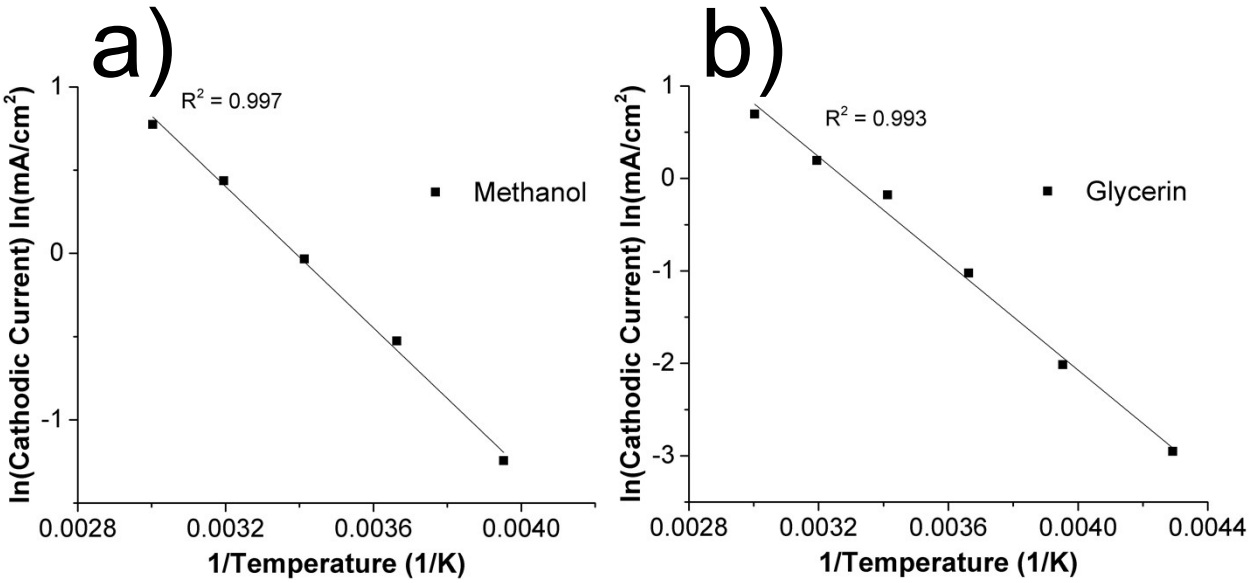

Figure S10: Arrhenius plots of maximum nucleation current density of metal electrodeposition in 25 cm^2 dynamic windows containing the Cu-Bi electrolyte with 60:40 vol % methanol:H_2O (a) and 60:40 vol% glycerol:H_2O (b).

Solvent System	**Viscosity (Pa-s)**
H_2O	9.5
60:40 vol% methanol:H_2O	9.5
60:40 vol% ethylene glycol:H_2O	10.3
60:40 vol% glycerol:H_2O	6.7

Figure S11: Viscosities of the Cu-Bi electrolytes at 20°C with varying solvent compositions and 3 wt. % hydroxyethylcellulose.

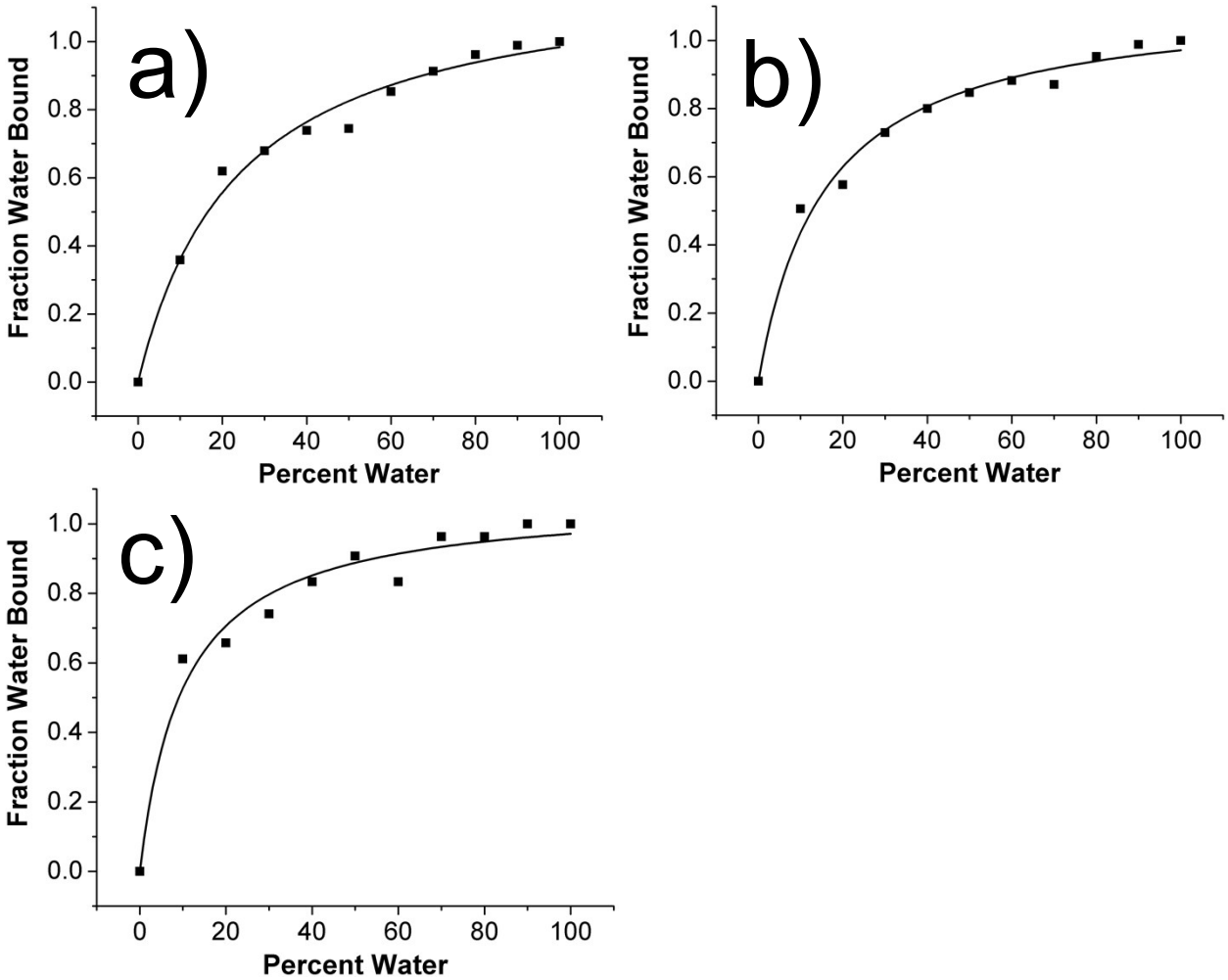

Figure S12: Binding curves for Cu^{2+} using a solution of 100 mM $CuCl_2$ in methanol (a), ethylene glycol (b), and glycerin (c) containing varying vol % of water. The fraction water bound is determined by measuring shifts in the d to d transition in the visible-NIR spectra. Best fit curves were obtained using the single ligand binding model in Sigma Plot v. 13 (Systat Software, Inc.).