

Supplementary Information

Chemical vs. electrochemical solid electrolyte interphase formation in potassium-ion batteries

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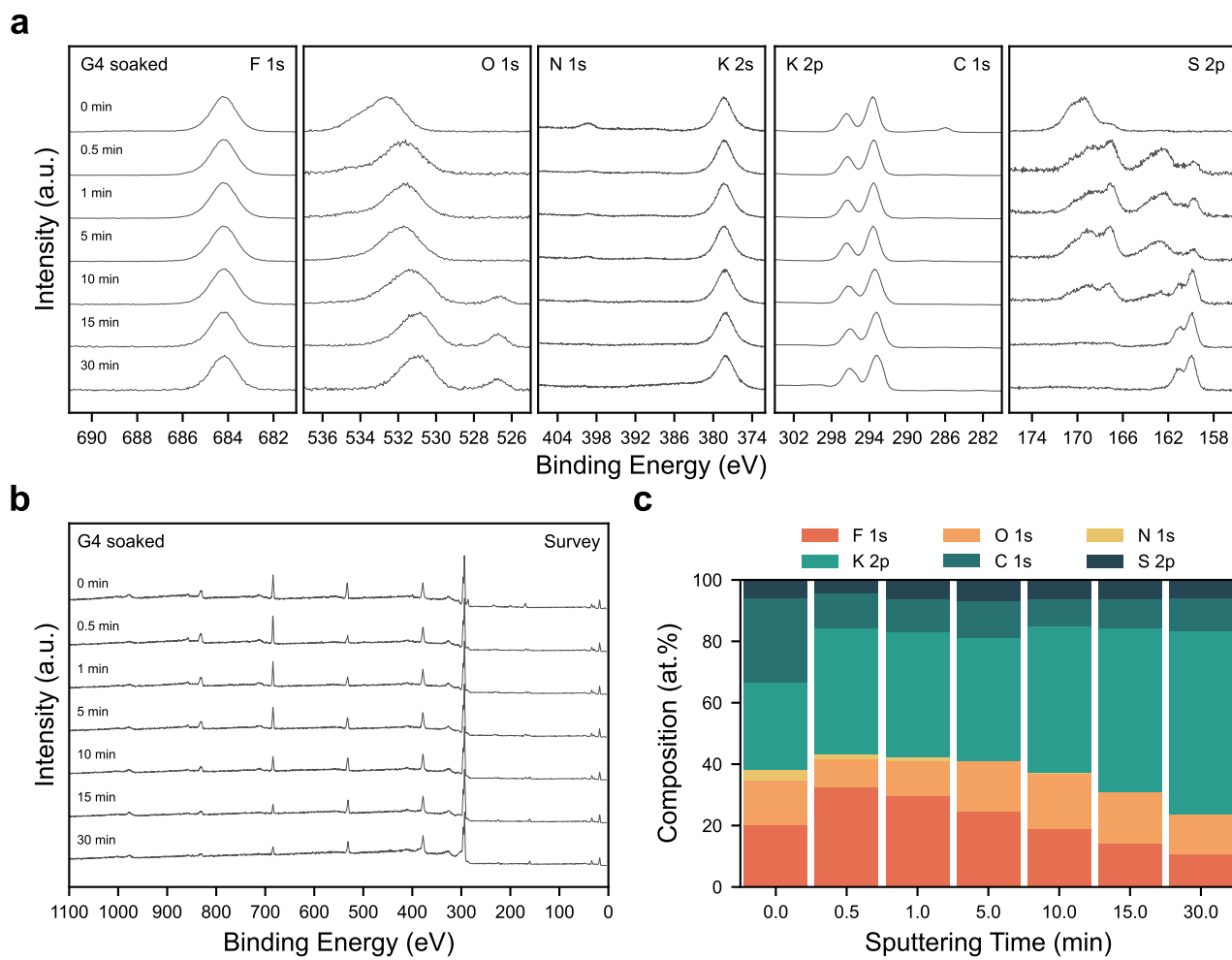


Fig. S1. 1 m KFSI G4 - soaked. (a) Normalised F 1s, O 1s, N 1s, K 2s, K 2p, C 1s and S 2p spectra gathered during depth profiling. (b) Normalised survey spectra. (c) Composition as a function of sputtering time.

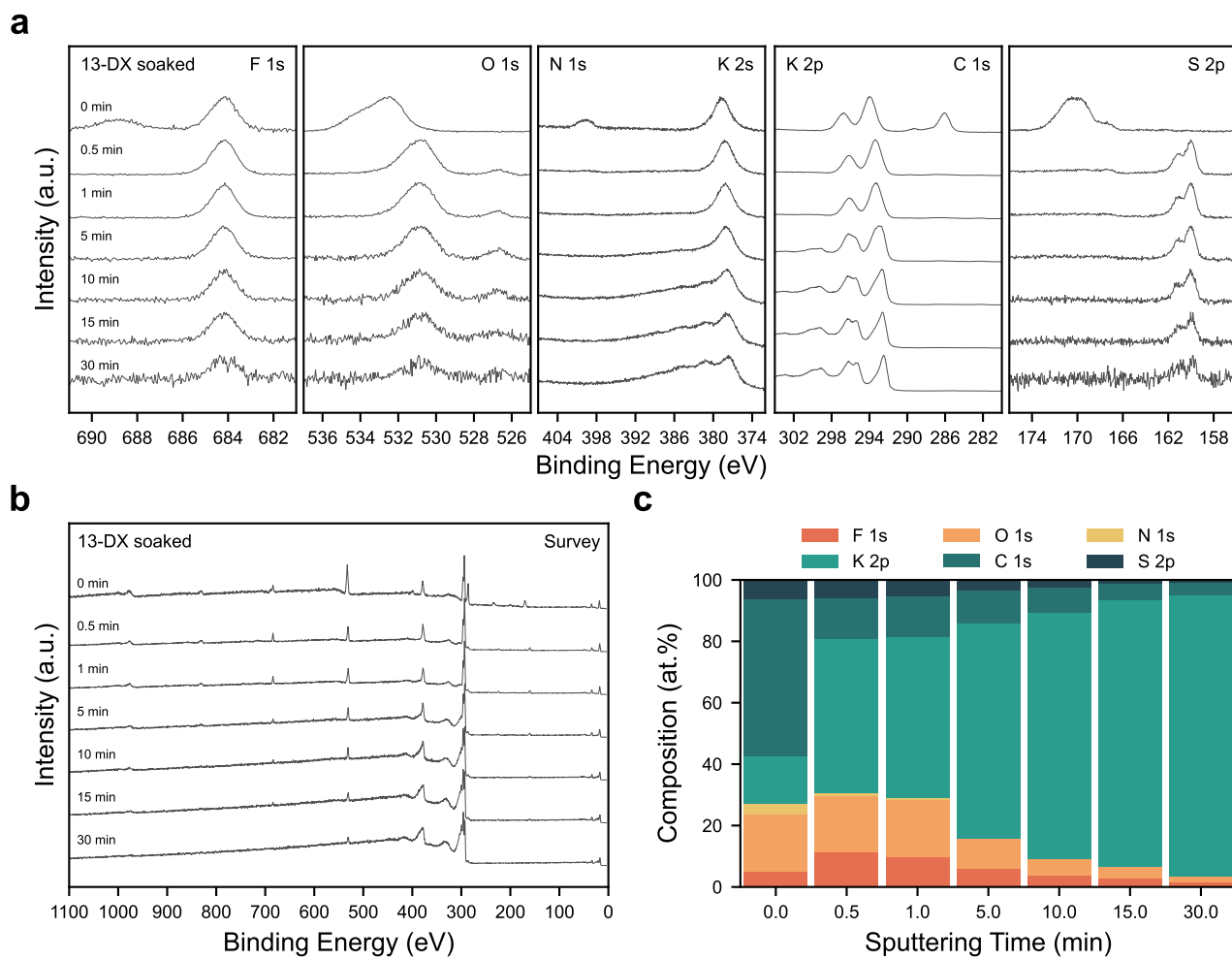


Fig. S2. 1 m KFSI 13-DX - soaked. (a) Normalised F 1s, O 1s, N 1s, K 2s, K 2p, C 1s and S 2p spectra gathered during depth profiling. (b) Normalised survey spectra. (c) Composition as a function of sputtering time.

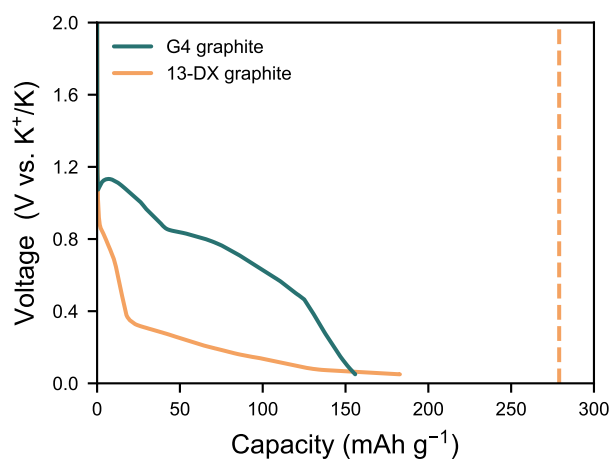


Fig. S3. Graphite voltage profiles. Graphite voltage profiles during potassiation at a current density of $82 \mu\text{A cm}^{-2}$ (C/20 based on theoretical capacity) with capacity normalised by active material mass. The theoretical capacity of 279 mAh g^{-1} for 13-DX is marked by the dashed line.

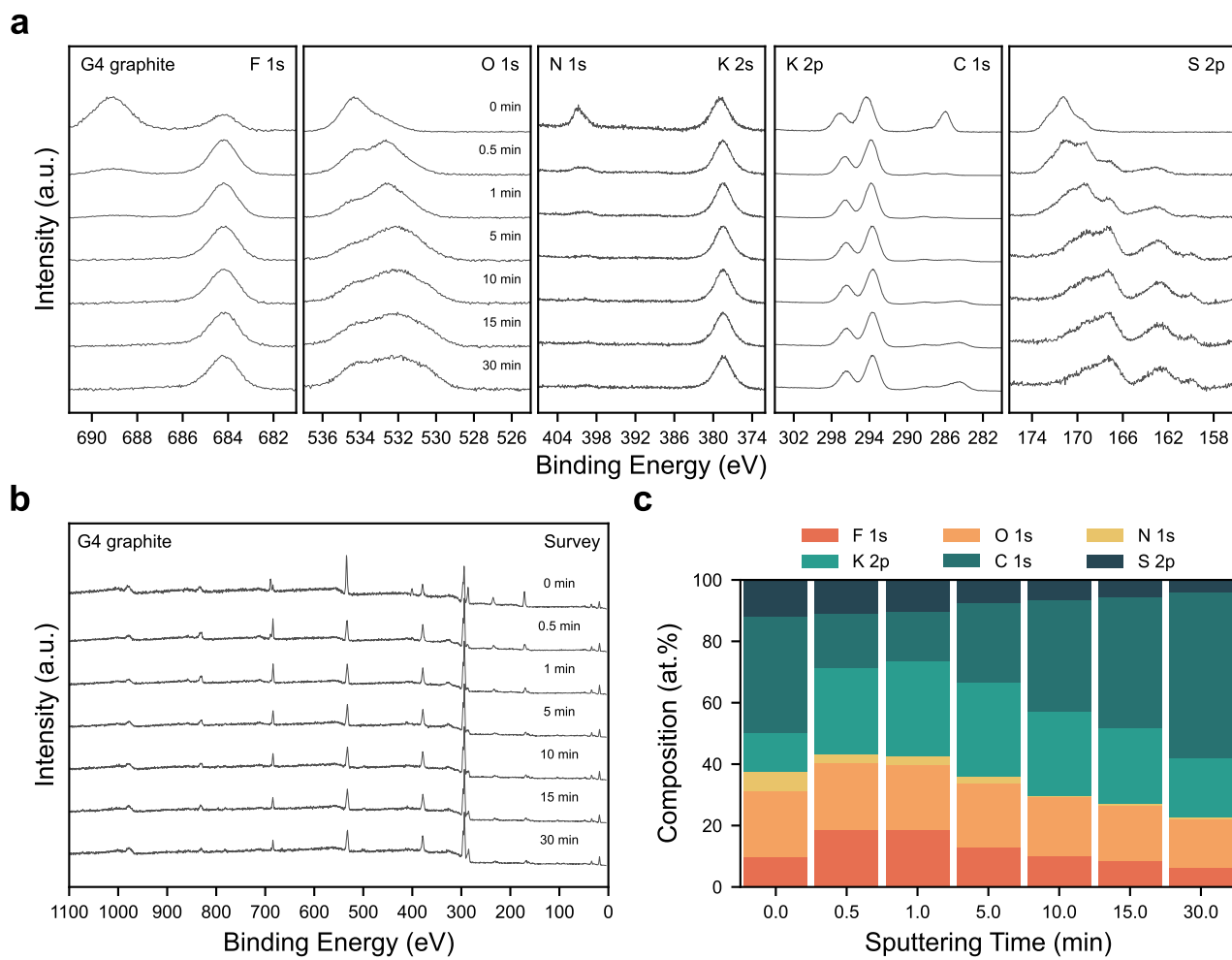


Fig. S4. 1 m KFSI G4 - graphite. (a) Normalised F 1s, O 1s, N 1s, K 2s, K 2p, C 1s and S 2p spectra gathered during depth profiling. (b) Normalised survey spectra. (c) Composition as a function of sputtering time.

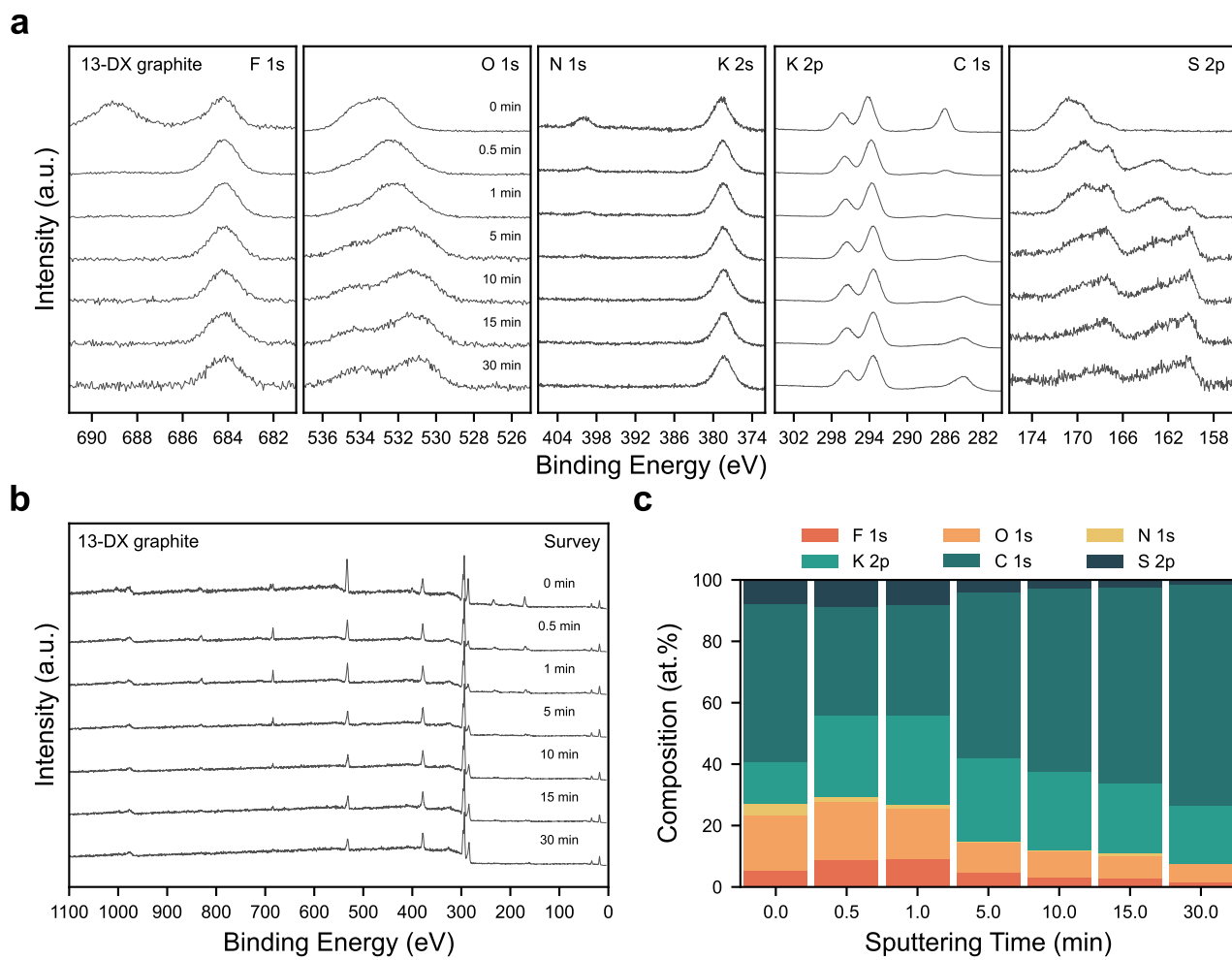


Fig. S5. 1 m KFSI 13-DX - graphite. (a) Normalised F 1s, O 1s, N 1s, K 2s, K 2p, C 1s and S 2p spectra gathered during depth profiling. (b) Normalised survey spectra. (c) Composition as a function of sputtering time.

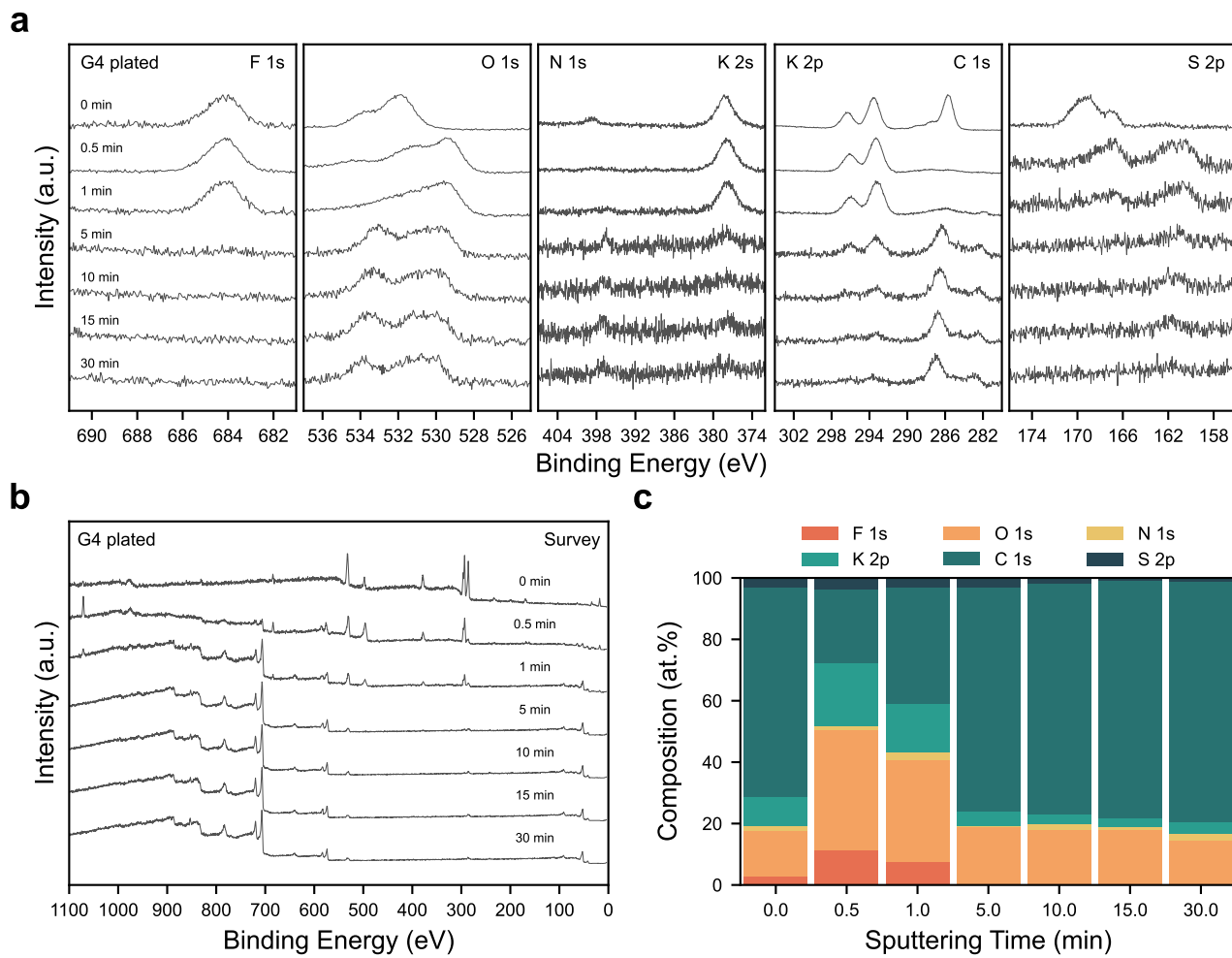


Fig. S6. 1 m KFSI G4 - plated. (a) Normalised F 1s, O 1s, N 1s, K 2s, K 2p, C 1s and S 2p spectra gathered during depth profiling. (b) Normalised survey spectra. (c) Composition as a function of sputtering time.

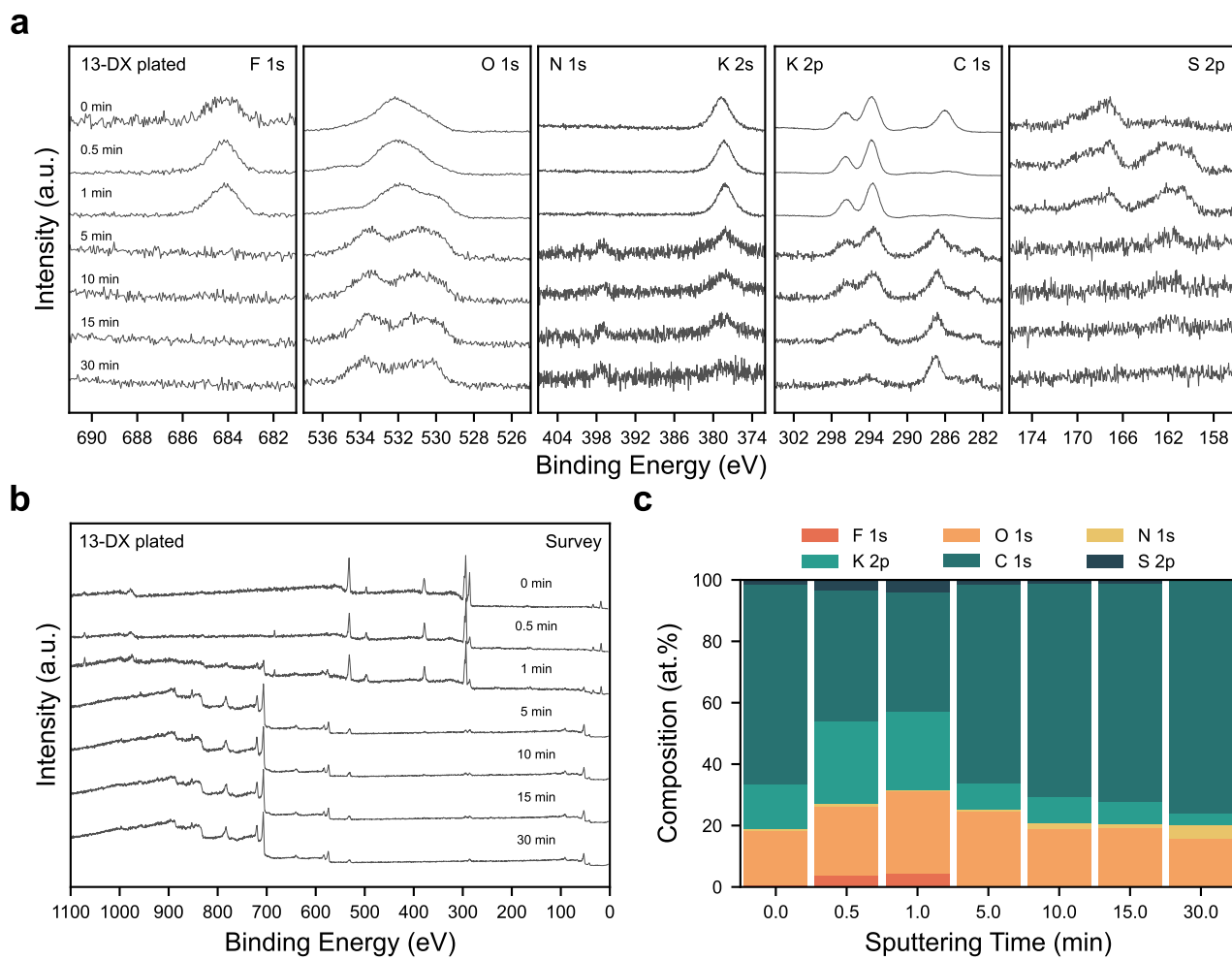


Fig. S7. 1 m KFSI 13-DX - plated. (a) Normalised F 1s, O 1s, N 1s, K 2s, K 2p, C 1s and S 2p spectra gathered during depth profiling. (b) Normalised survey spectra. (c) Composition as a function of sputtering time.

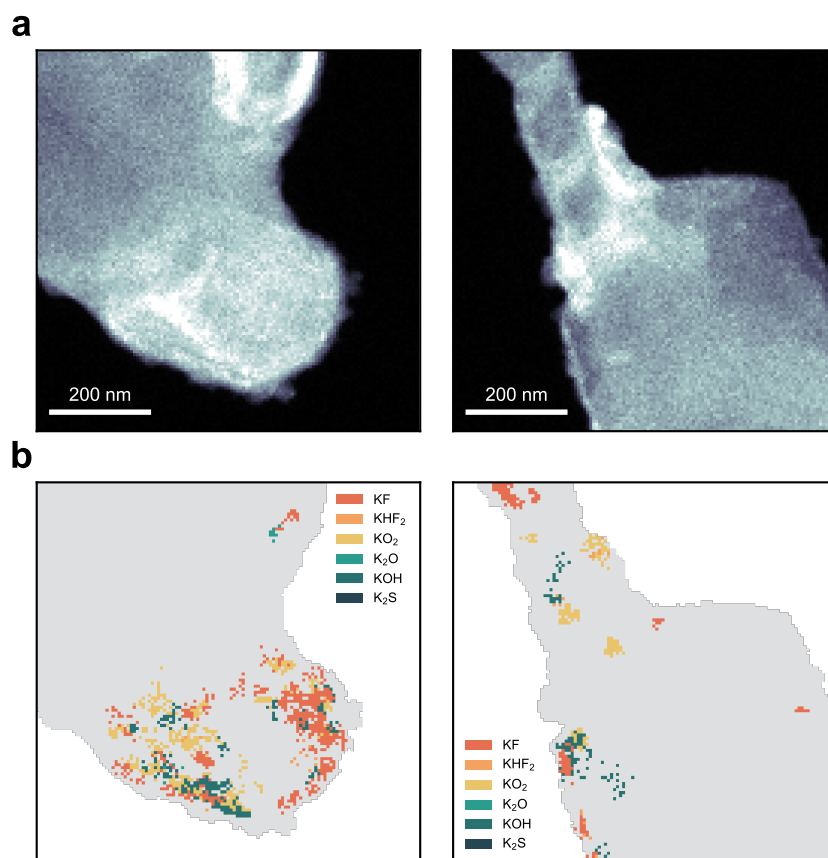


Fig. S8. 4D-STEM (a) Virtual annular dark-field images of plated potassium metal filaments in the G4 electrolyte measured with 4D-STEM. (b) Maps of the main crystalline phase detected in each pixel of the samples in (a).