Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Non-Confined Gamma Monoclinic Sulfur Cathode in Carbonate Electrolyte Based Room Temperature K-S Batteries

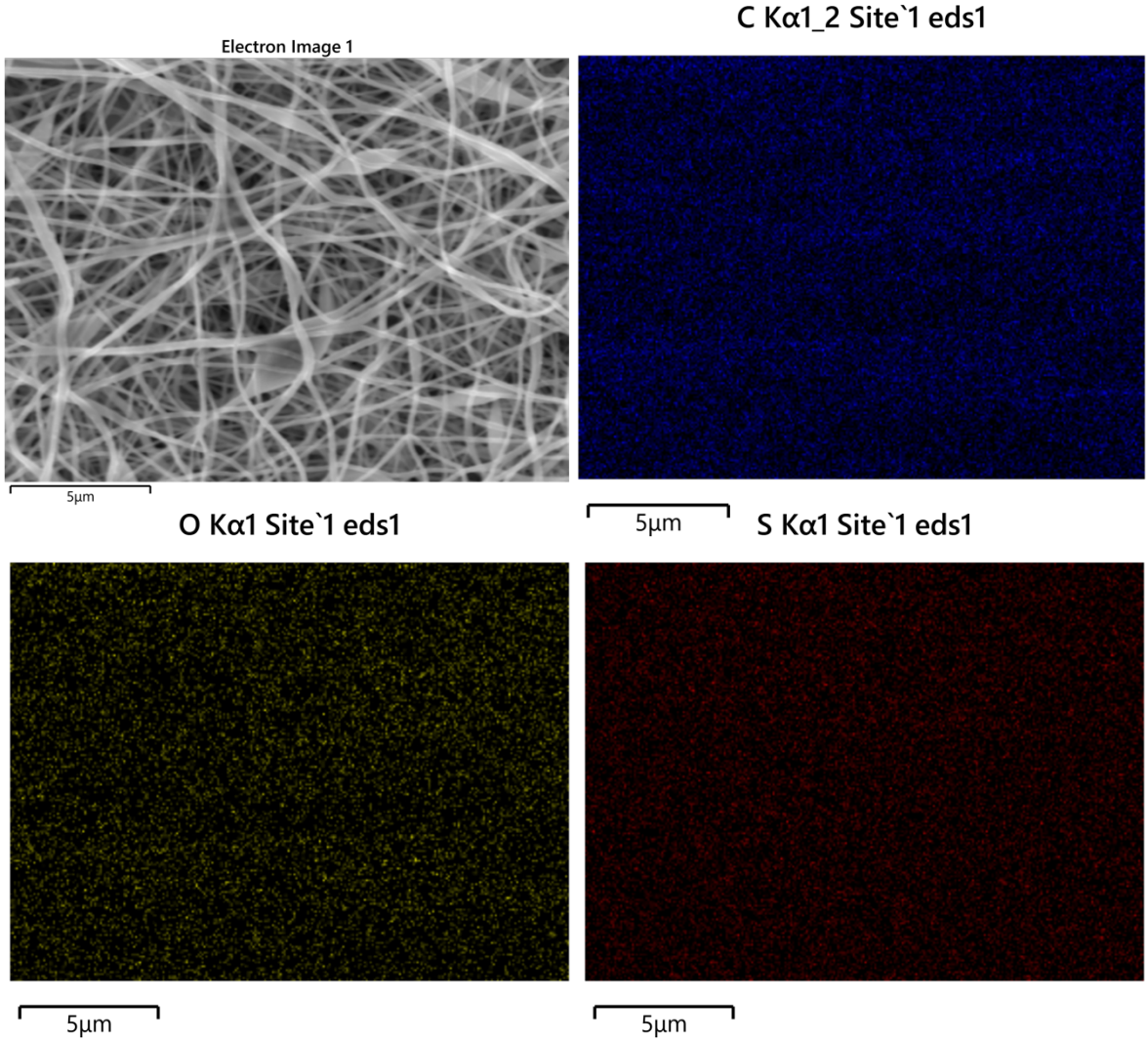

Figure S1 EDS data from γ-S CNF

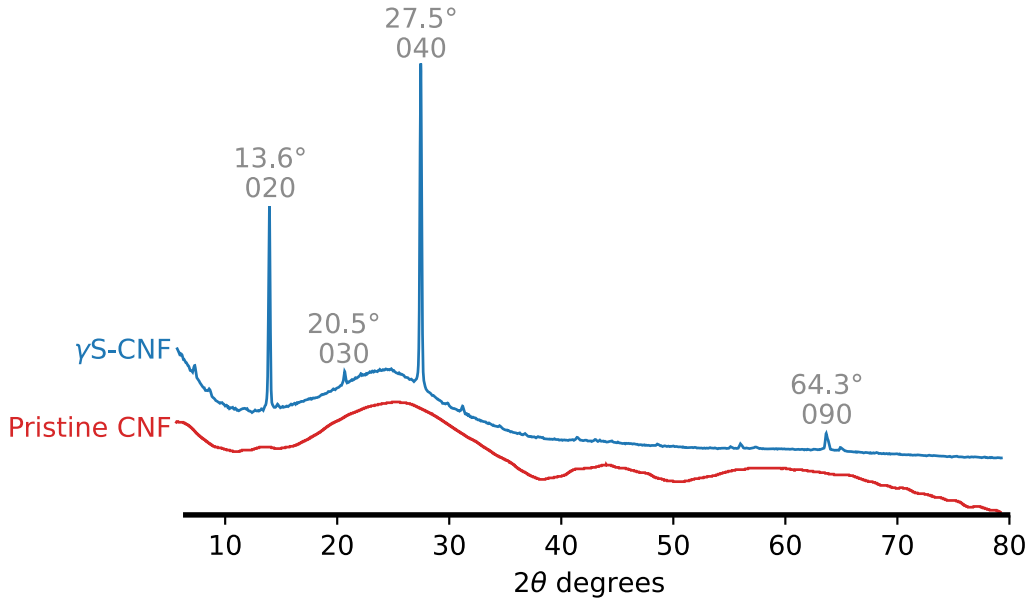

Figure S2 XRD pattern before and after γS deposition

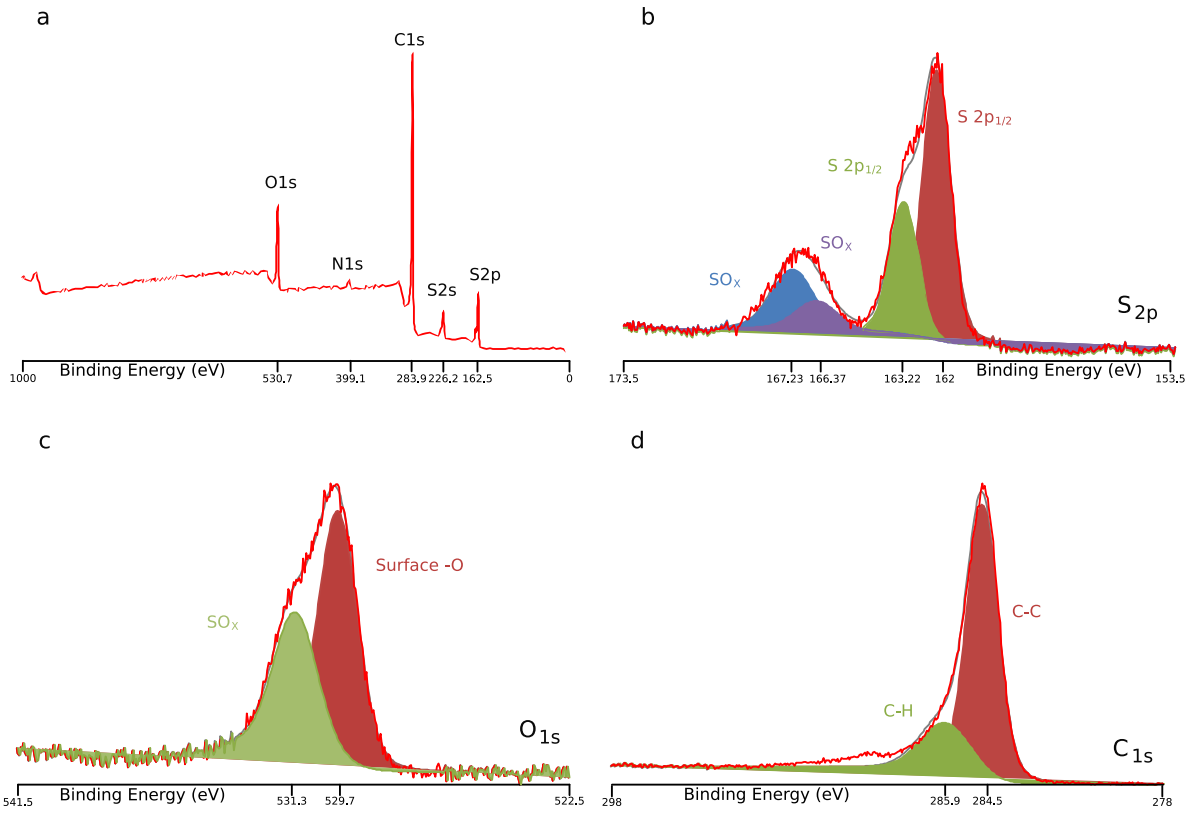

Figure S3 XPS survey

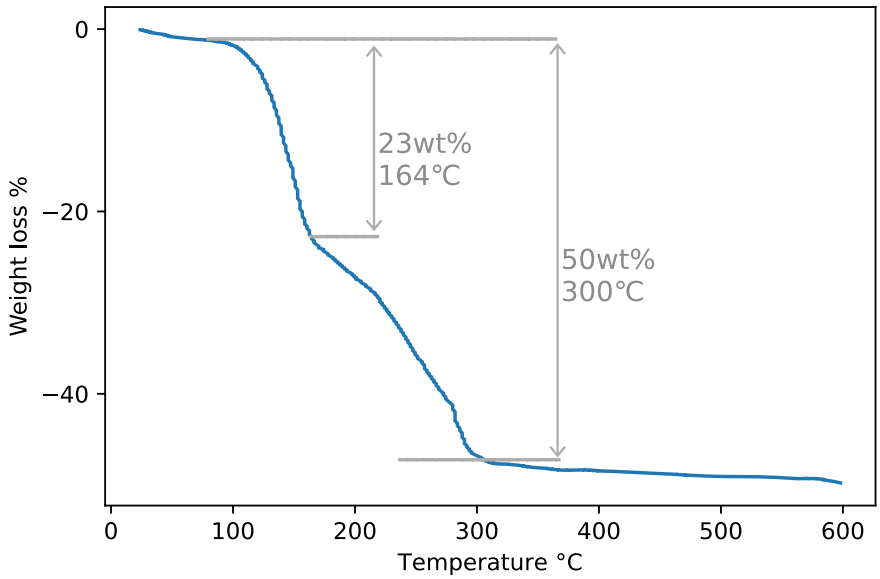

Figure S4 TGA analysis of γS-CNFs in argon environment showing S loss of ~ 50wt%

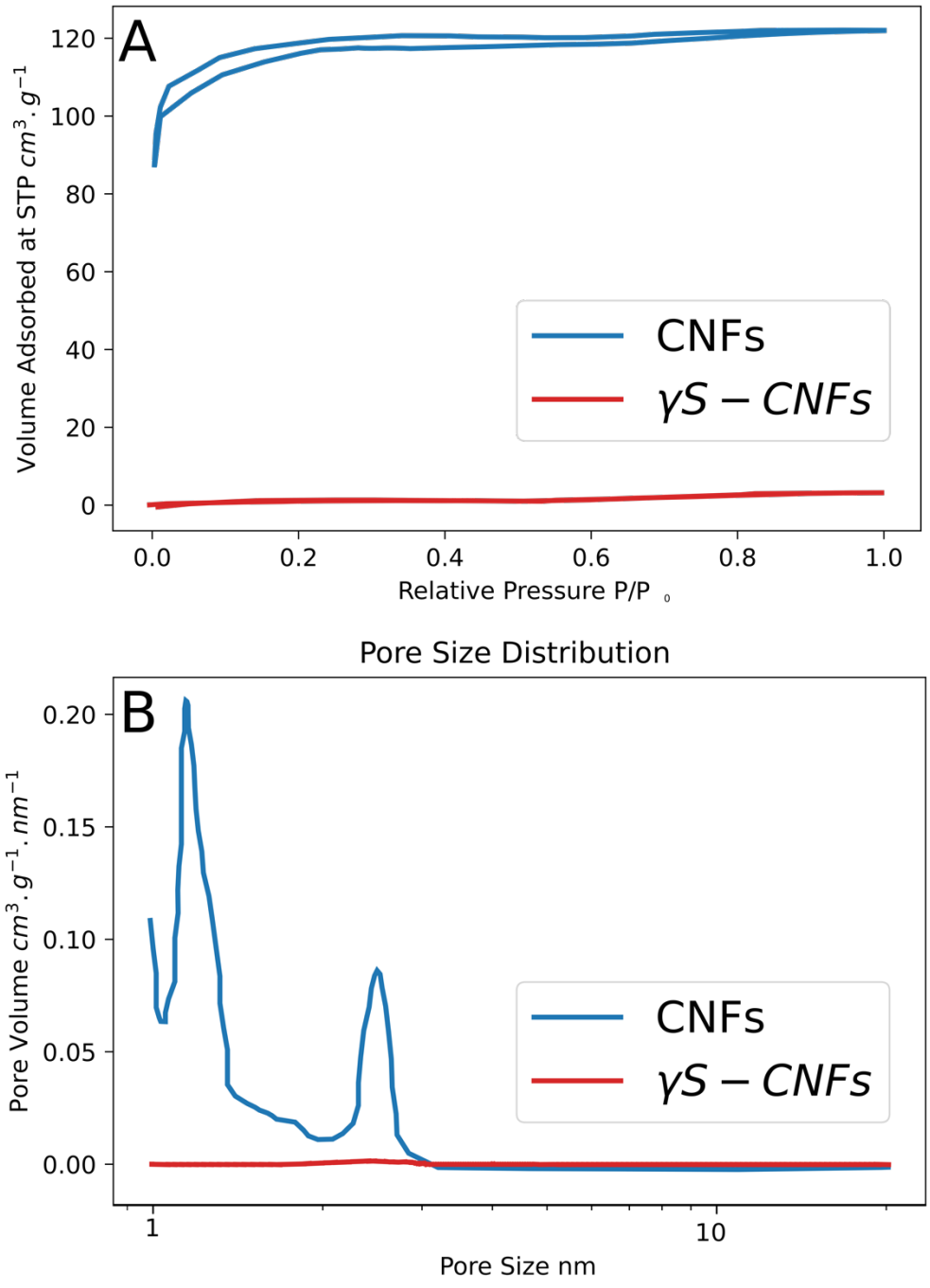

Figure S5 Porosity measurements before and after sulfur deposition on CNFs A)BET N_2 absorption/desorption isotherm plots. For CNFs exhibits a plateau at middle and high relative pressures, with a sharp increase at low relative pressures (P/P_0 <0.05). The hysteresis between 0.2 < P/P_0 <1.0 represents mesoporsity. The isotherms is combination of IUPAC types I and IV, showing the presence of microporsity and mesoporosity. This can be seen in B) the pore size distribution which shows lack of porosity after sulfur deposition.

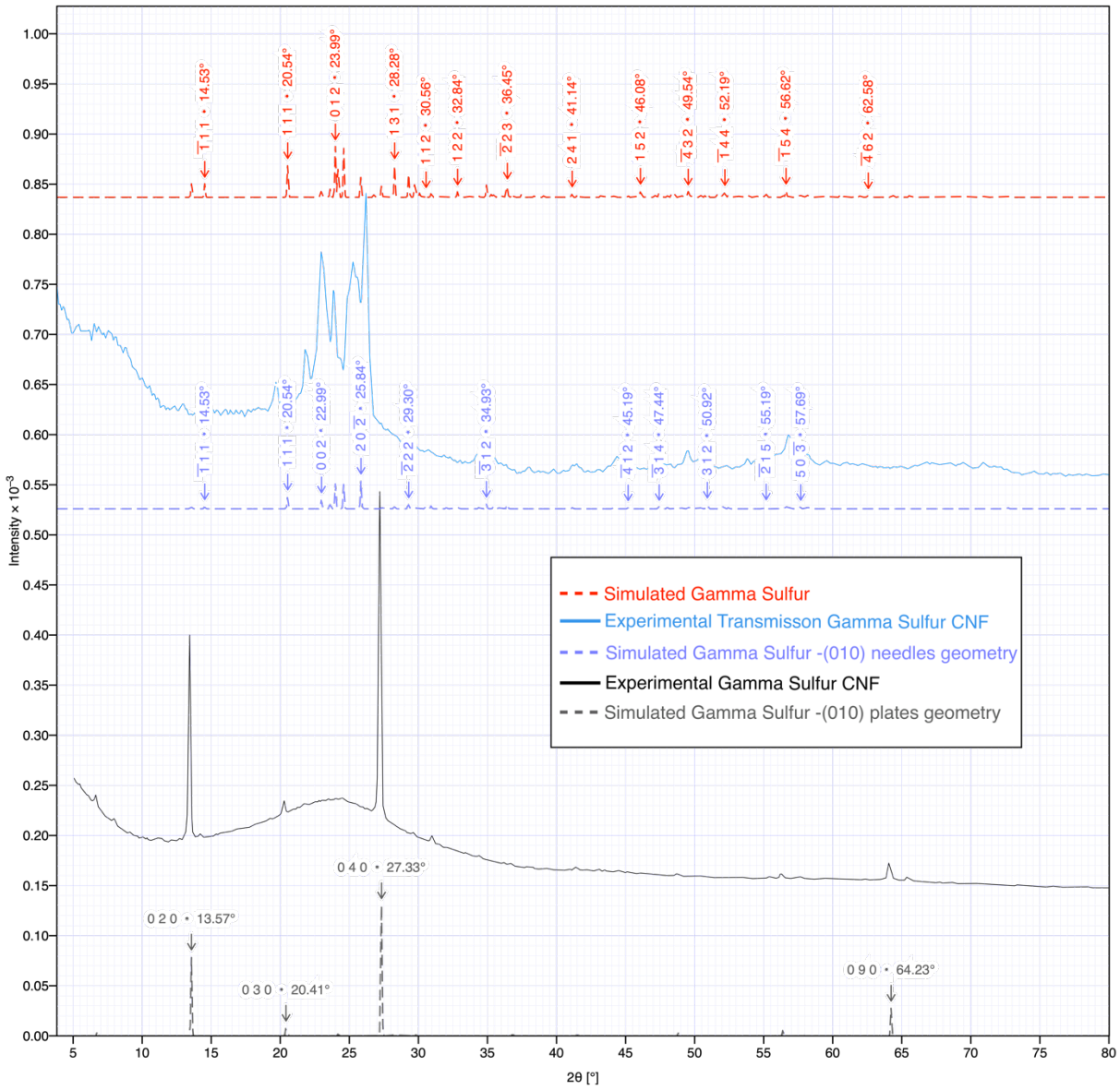

Figure S6 XRD of the various γS simulations and γS CNF expanded from Figure 3, intensities have been altered to fit the spectra on a single graph. Simulated γS in red closely resembles the xrd of Rosickyite. This is due to the fact that Rosickyite is the rare but naturally occurring mineral form of γS. [1,2]

Citations

1 S. Douglas and H. Yang, Mineral biosignatures in evaporites: Presence of rosickyite in an endoevaporitic microbial community from Death Valley, California, *Geology*, 2002, **30**, 1075–1078.

2 R. J. King, >Minerals explained 27: Sulphur, *Geology Today*, 1999, **15**, 157–160.