Supporting Information:

Optimizing Discharge Product Morphology with Hetero-Nanostructured $NiCoP/NiCo_2O_4$ for Enhanced Sustainability in Li-O_2 Battery Performance

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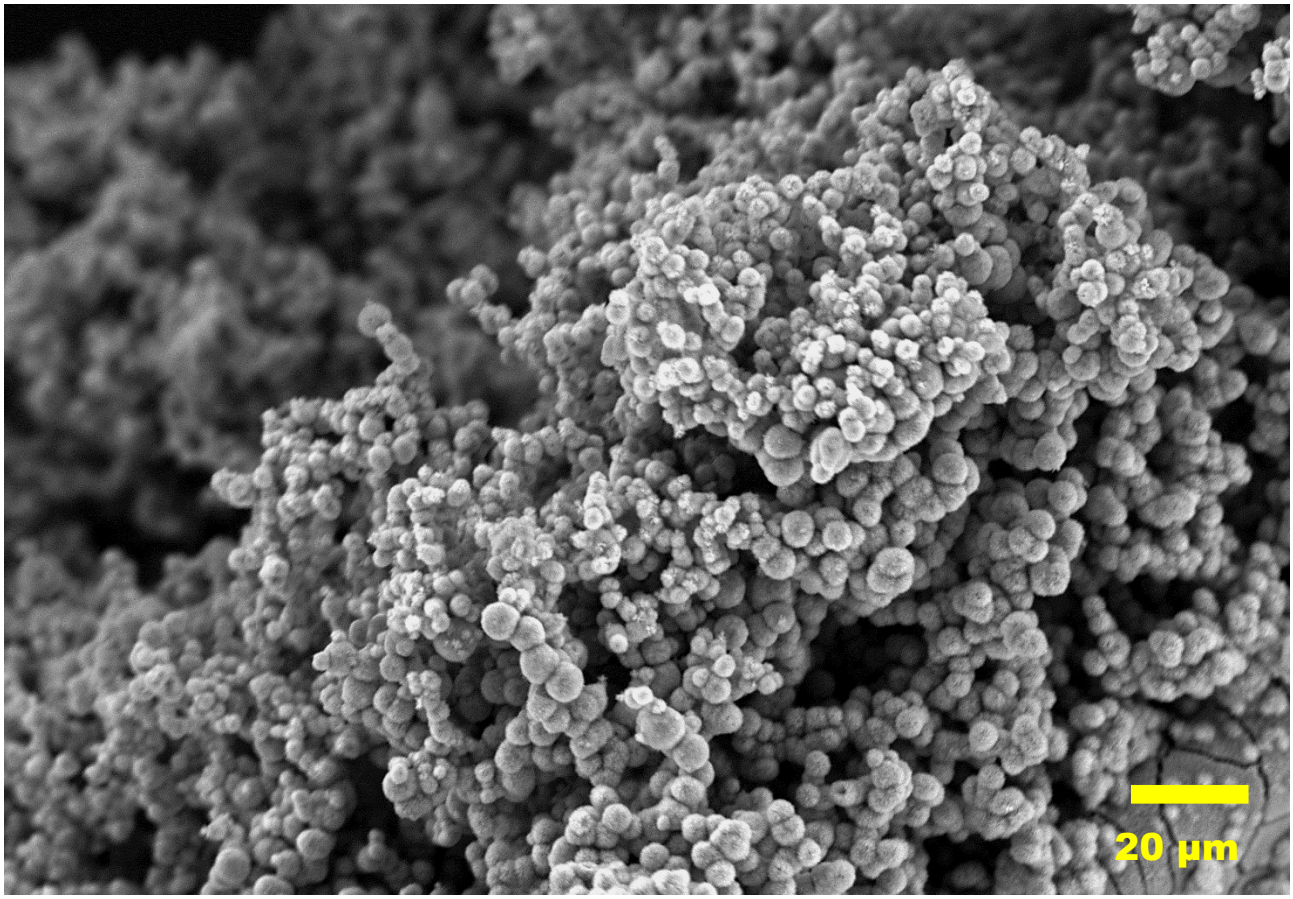

Figure S1: SEM image of the hydrothermal product

Figure S2: SEM image of the $NiCo_2O_4$ precursor

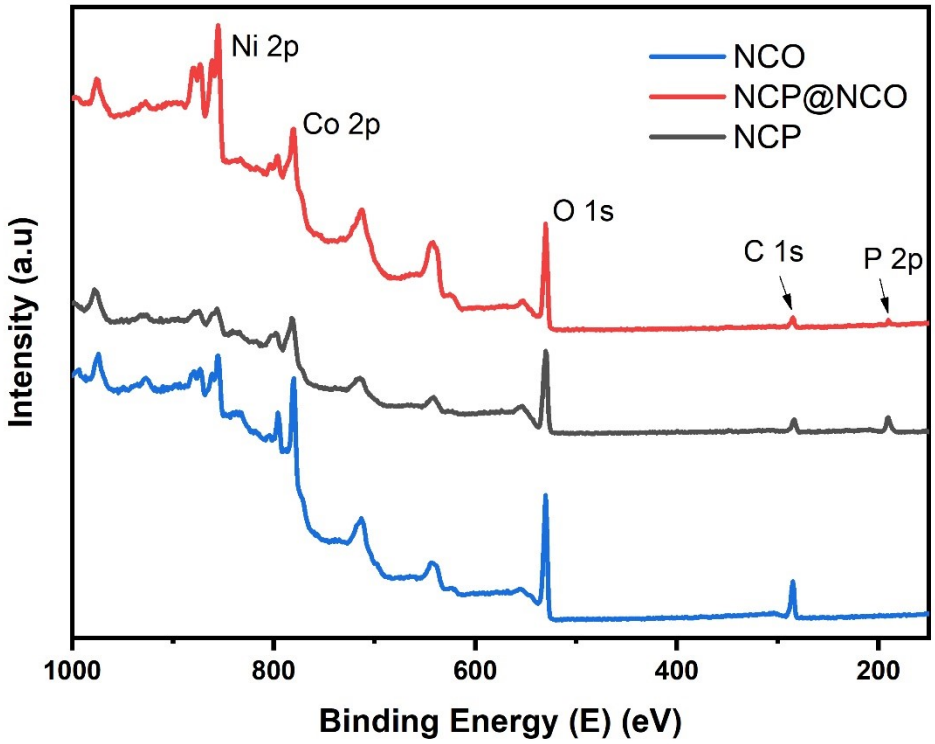

Figure S3: Survey Scan for $NiCo_2O_4$ (NCO), NiCoP (NCP), and $NiCo_2O_4$ and NiCoP (NCP@NCO) hybrid structure

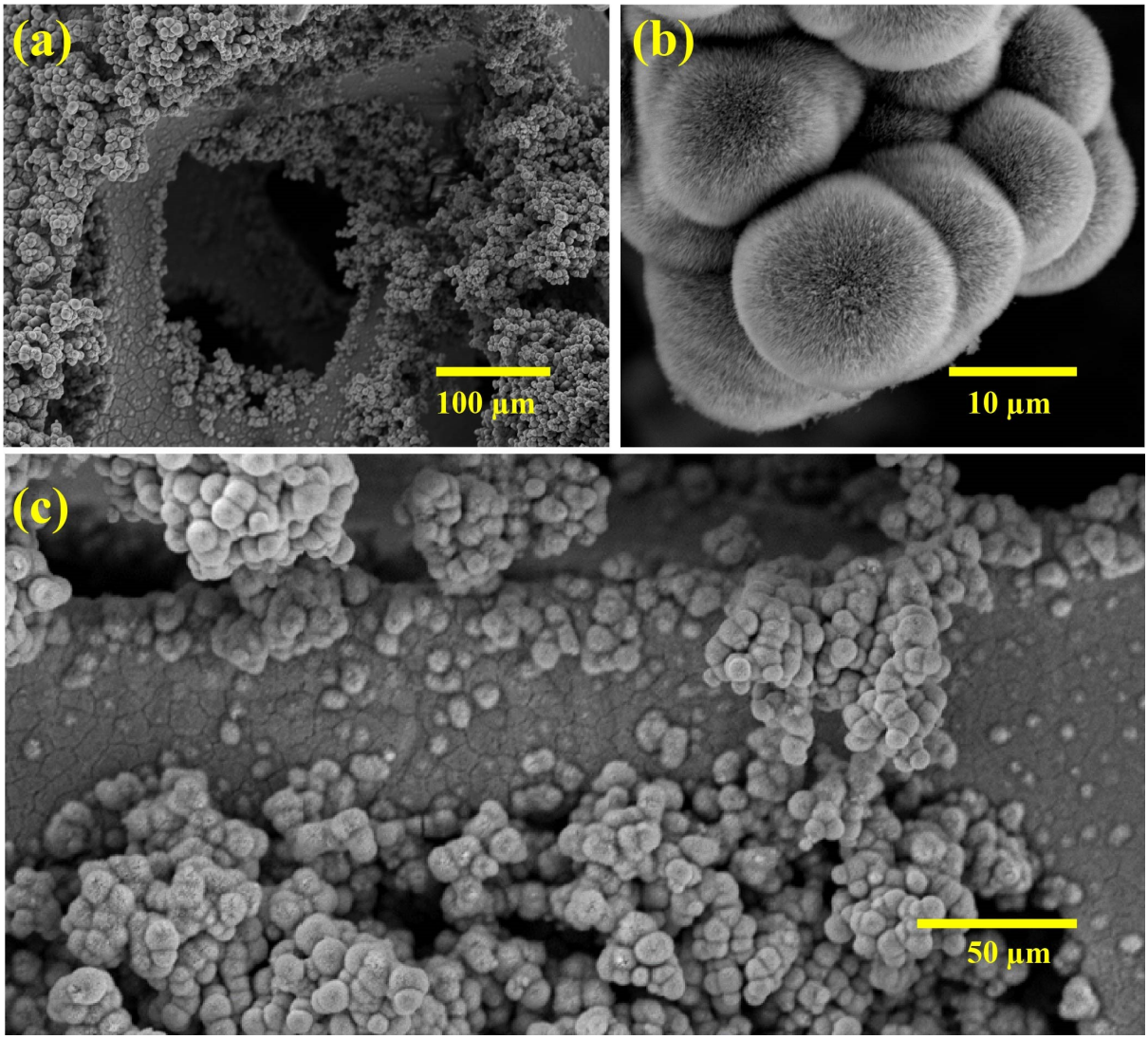

Figure S4: SEM images of NiCoP grafted on Ni foam (a-c)

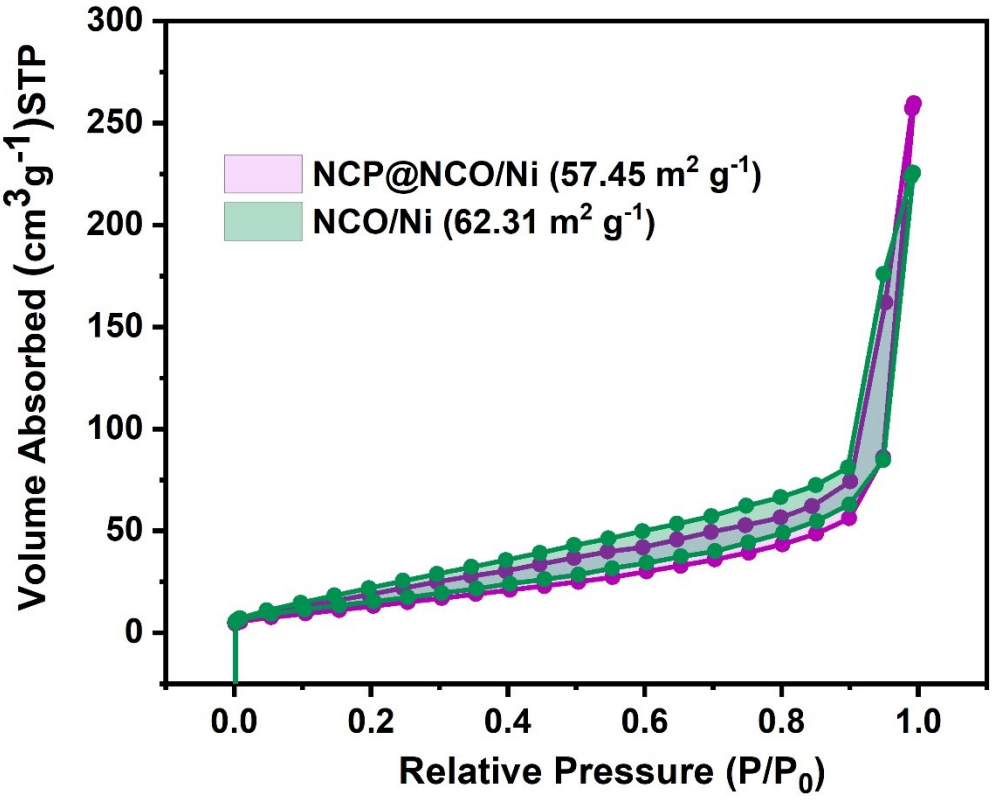

Figure S5: BET analysis for NCO and NCP@NCO

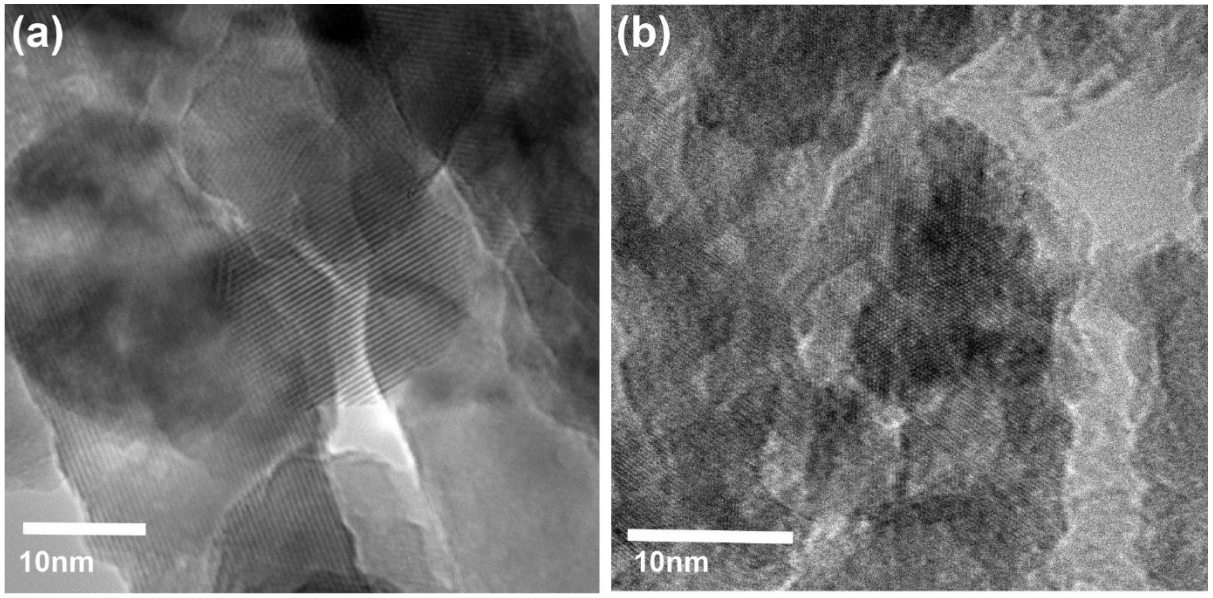

Figure S6: HRTEM images of (a) NCO and, (b) NCP@NCO

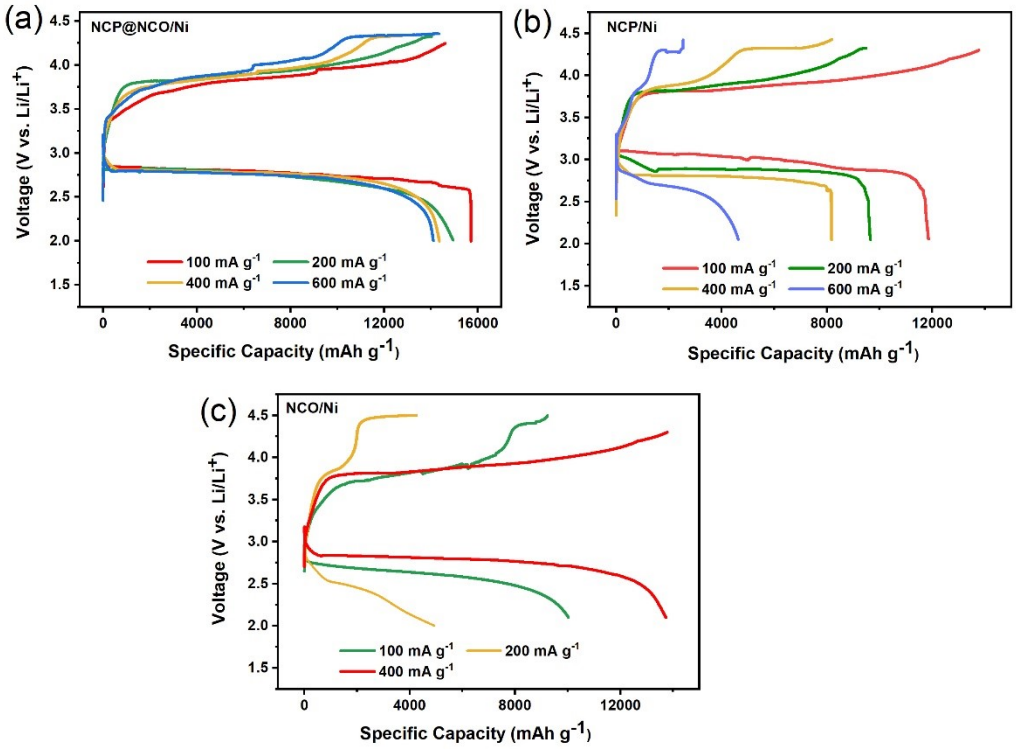

Figure S7: Rate Performance- Galvanostatic Discharge/Charge curves for (a) NCP@NCO/Ni, (b) NCP/Ni, and (c) NCO/Ni

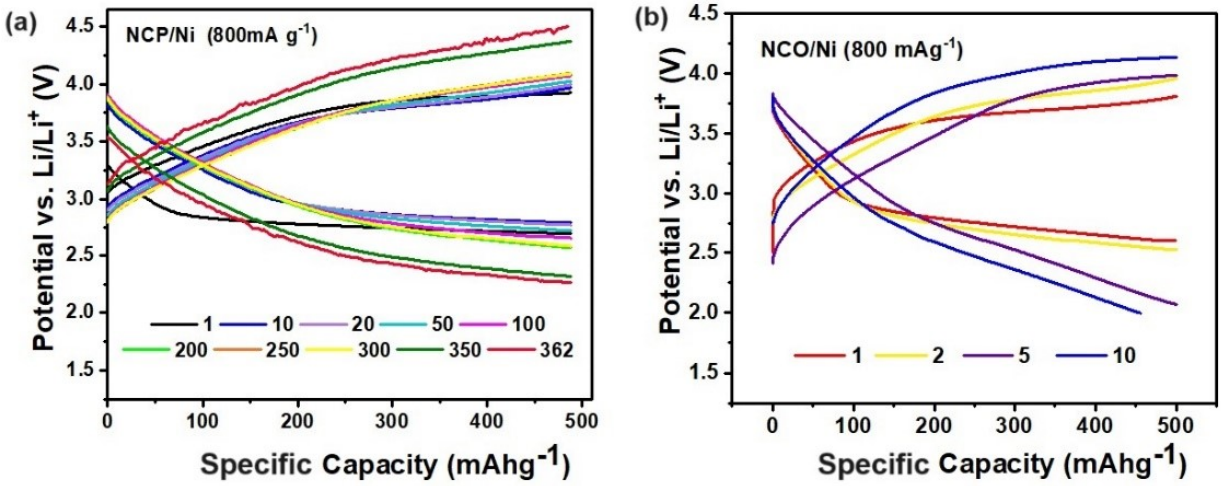

Figure S8: Selected individual discharge/charge curves of a) NCP/Ni and b) NCO/Ni at 800 mAg^{-1} with 500 mAh g^{-1} limited capacity.

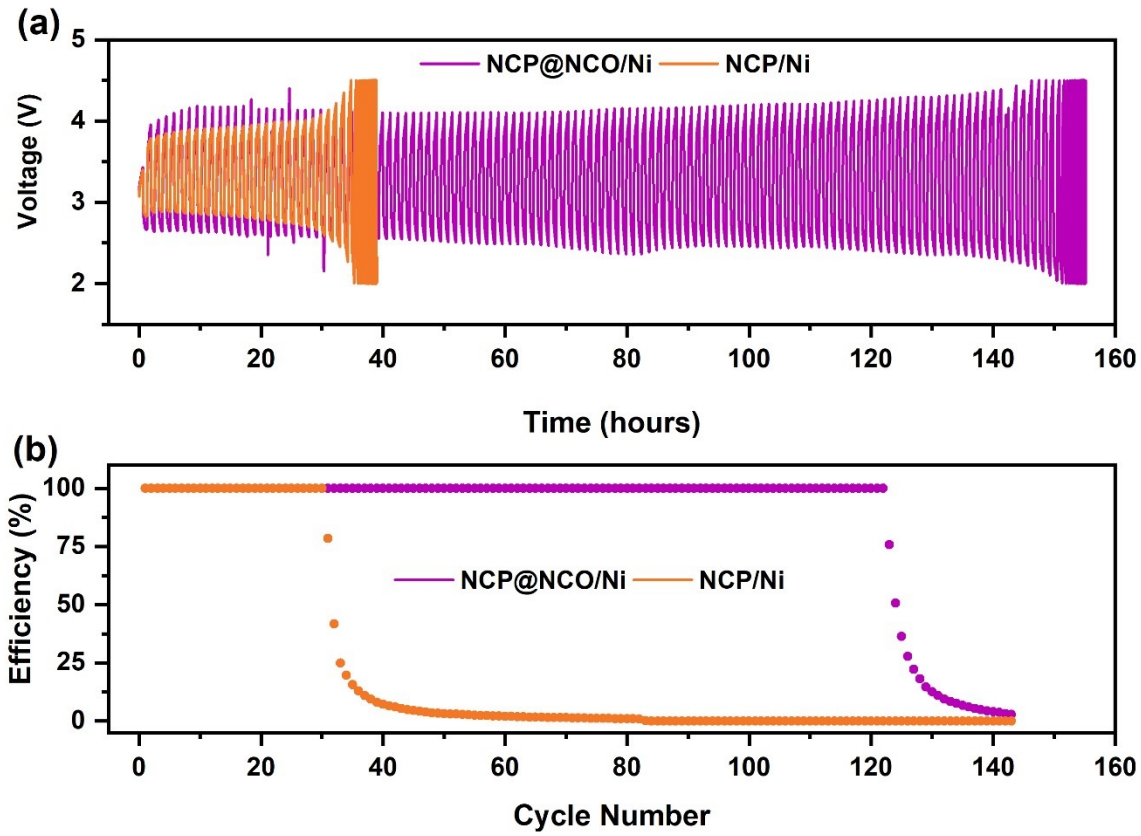

Figure S9: Cycle Performances of NCP@NCO/Ni and NCP/Ni cathode-based LOB at 800 mAg^{-1} under limited capacity of 1000 $mAhg^{-1}$.

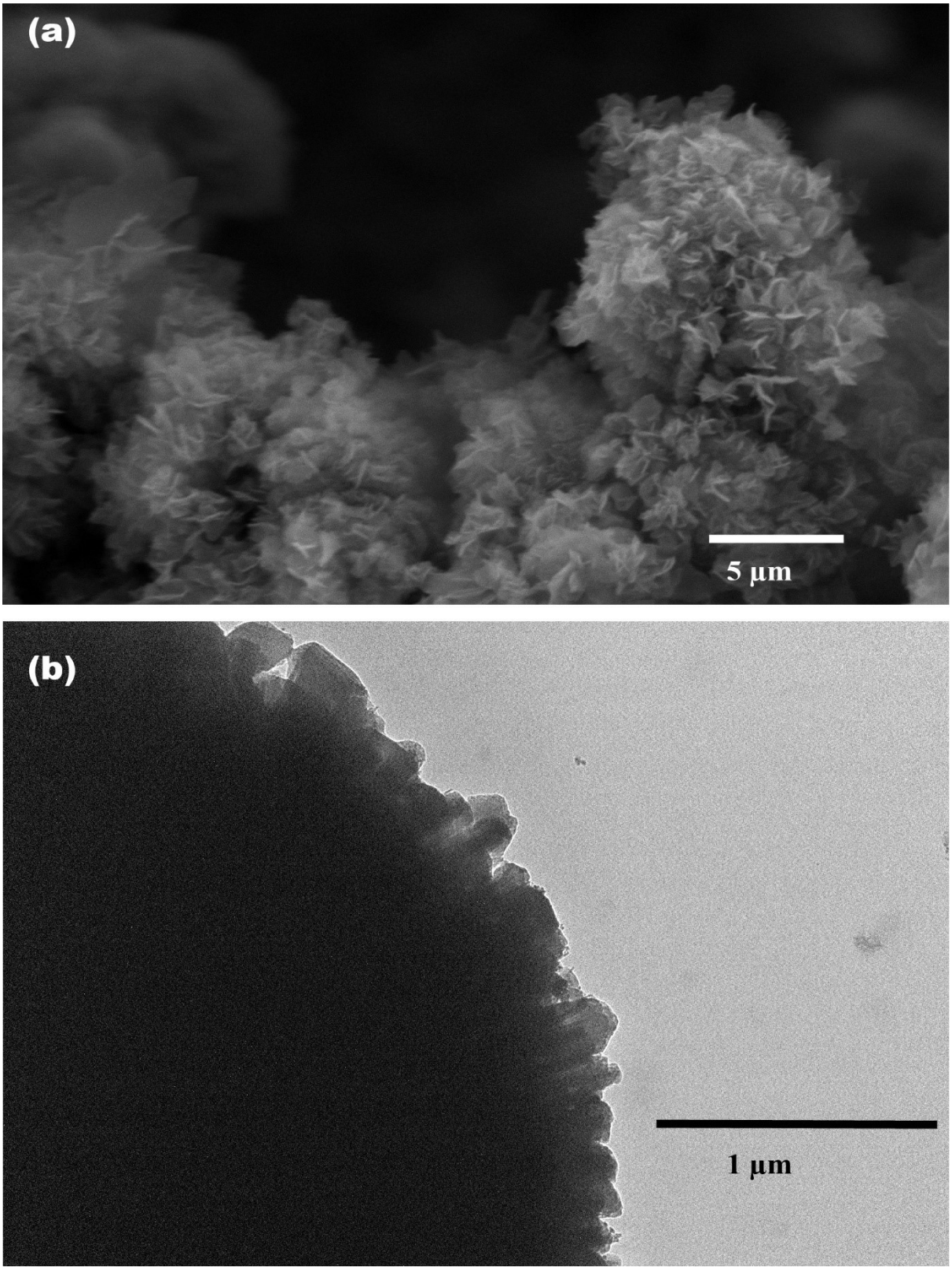

Figure S10: (a) SEM, and (b) TEM images of discharged cathode of NCP@NCO/Ni

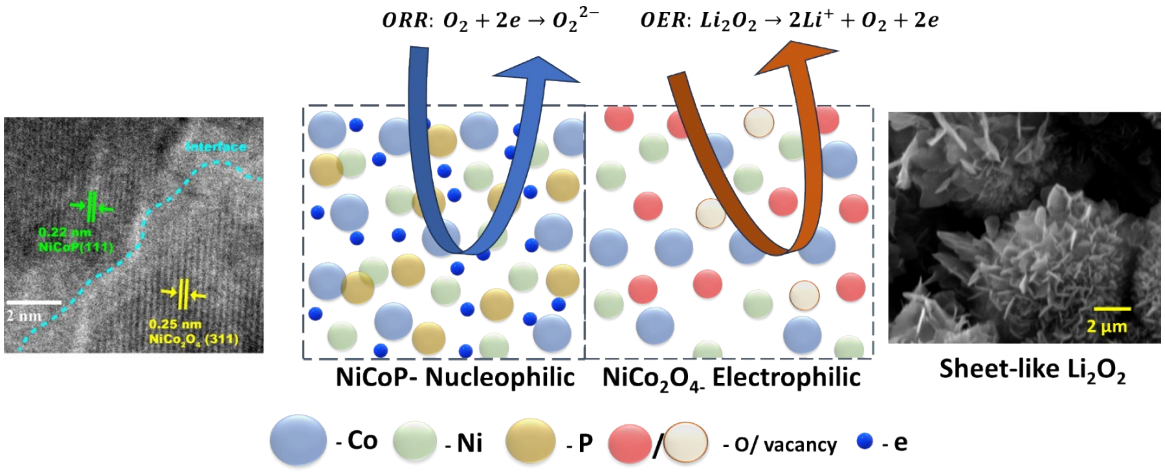

Figure S11: Suggested growth mechanism of sheet-like Li_2O_2

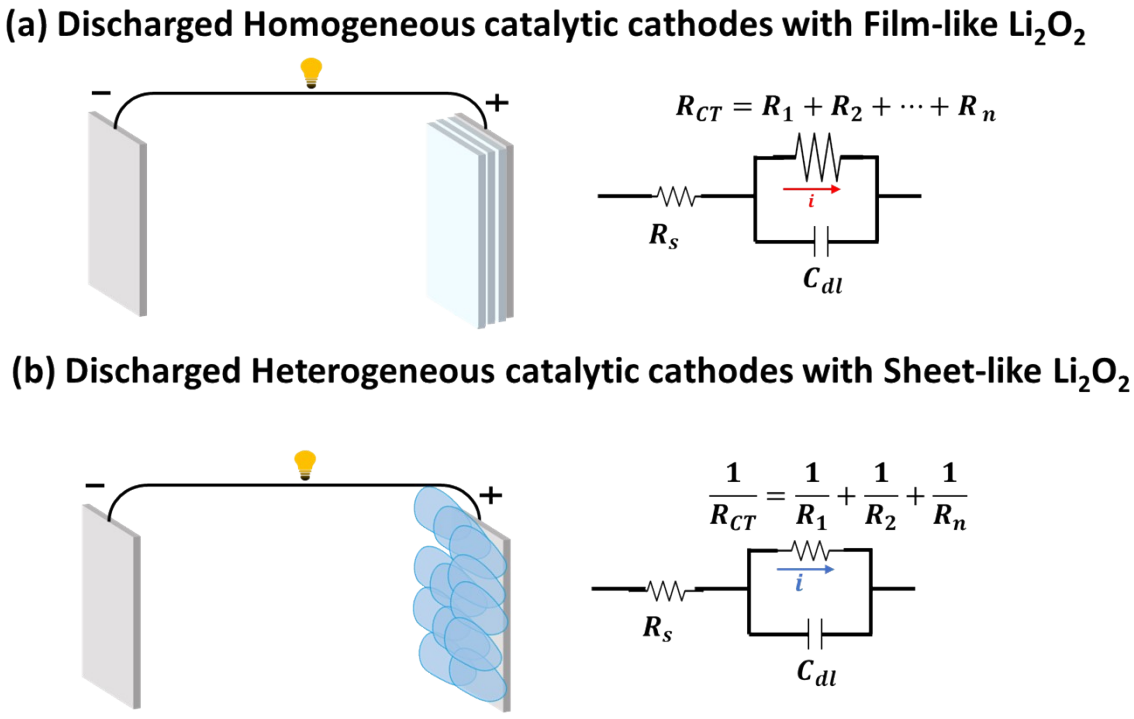

Figure S12: Suggested equivalence circuit model to demonstrate the effect of film-like and the sheet-like Li_2O_2 growth

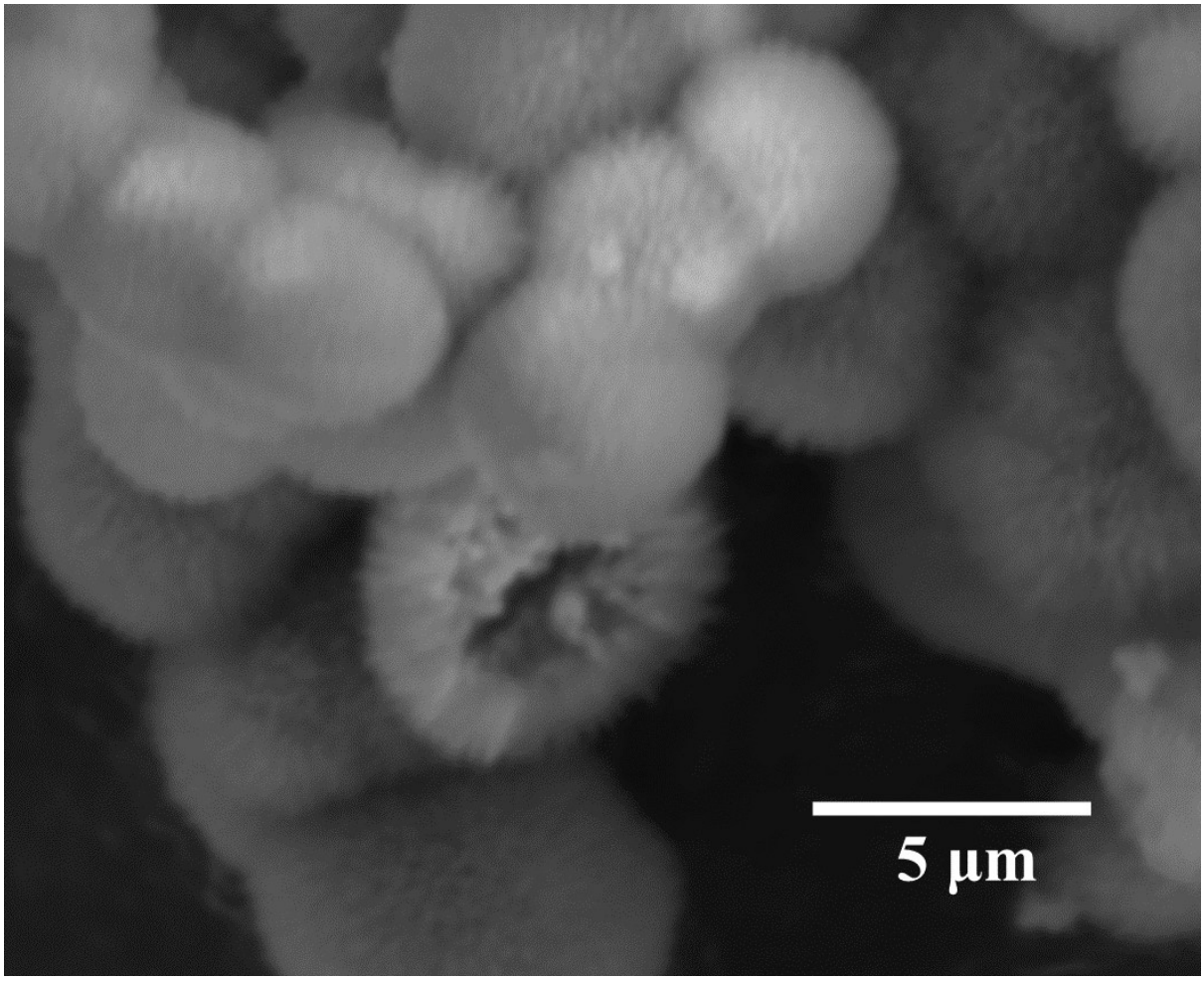

Figure S13: Hollow core on the broken sphere

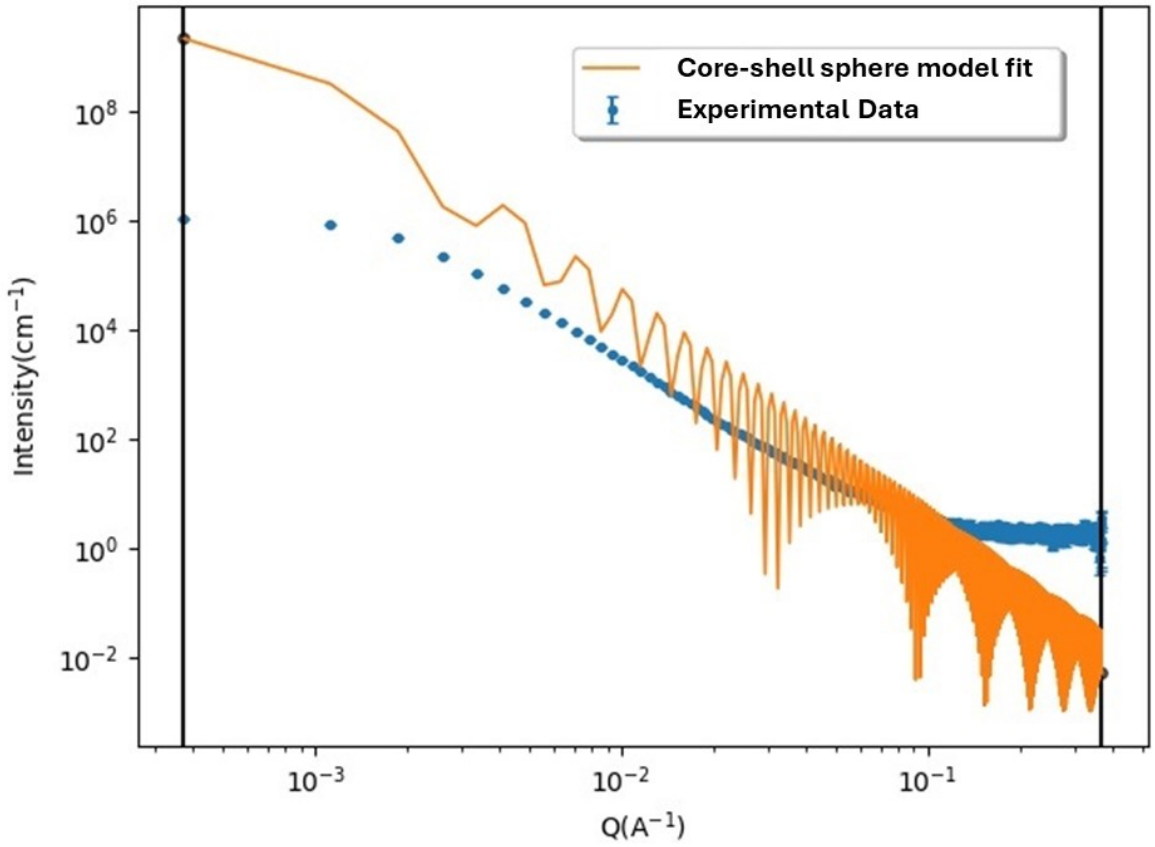

Figure S14: Unsuccessful core-shell spherical structure model fitting for SAXS results due to particle size incompatibility