

## Electronic supplementary information

### **New insights into orthophosphoric acid assisted rapid aqueous processing of NMC622 cathodes**

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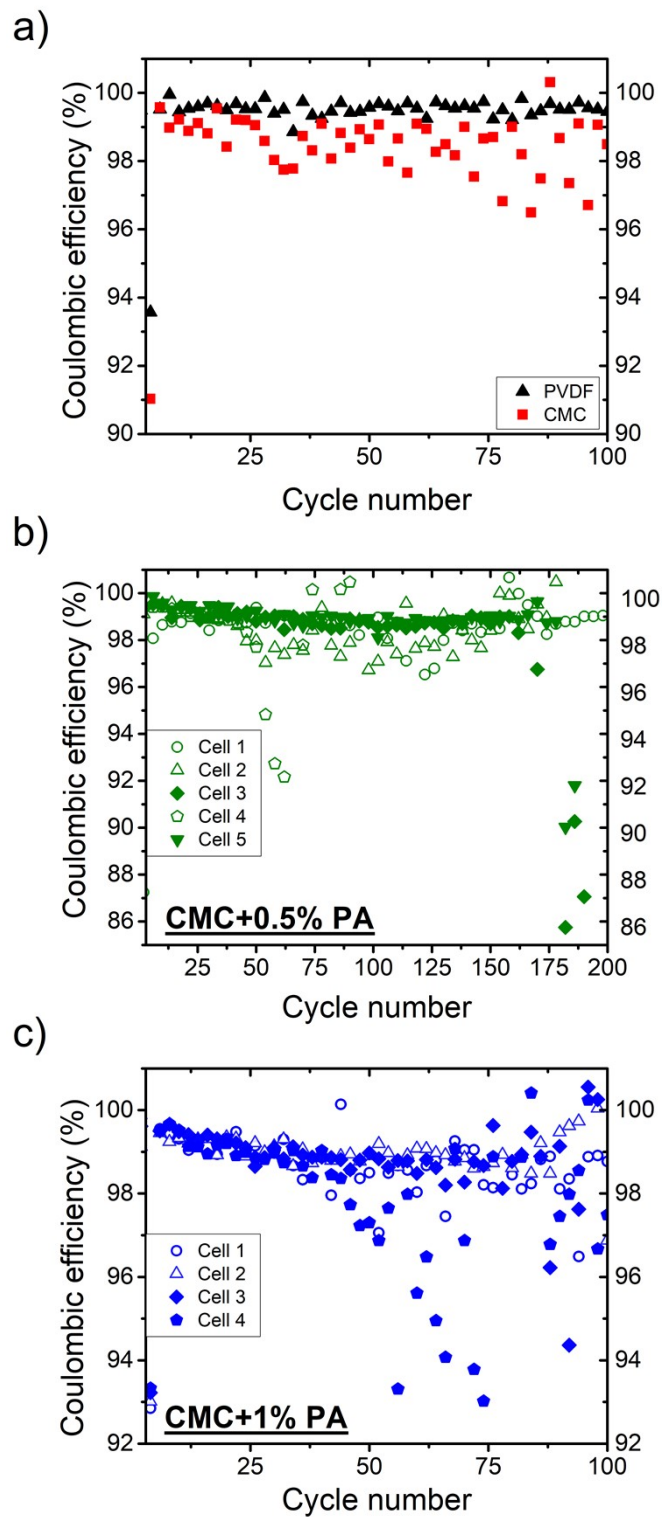


Figure S1. Coulombic efficiencies for cycling at  $C/2$  of electrodes utilising binders of: a) PVDF and CMC, b) CMC with 0.5% phosphoric acid, and c) CMC with 1.0% phosphoric acid. For PVDF and CMC the values given are an average of 3 cells, for electrodes using phosphoric acid additions the data from individual cells are shown. Note that this data complements Figure 1 in main text.

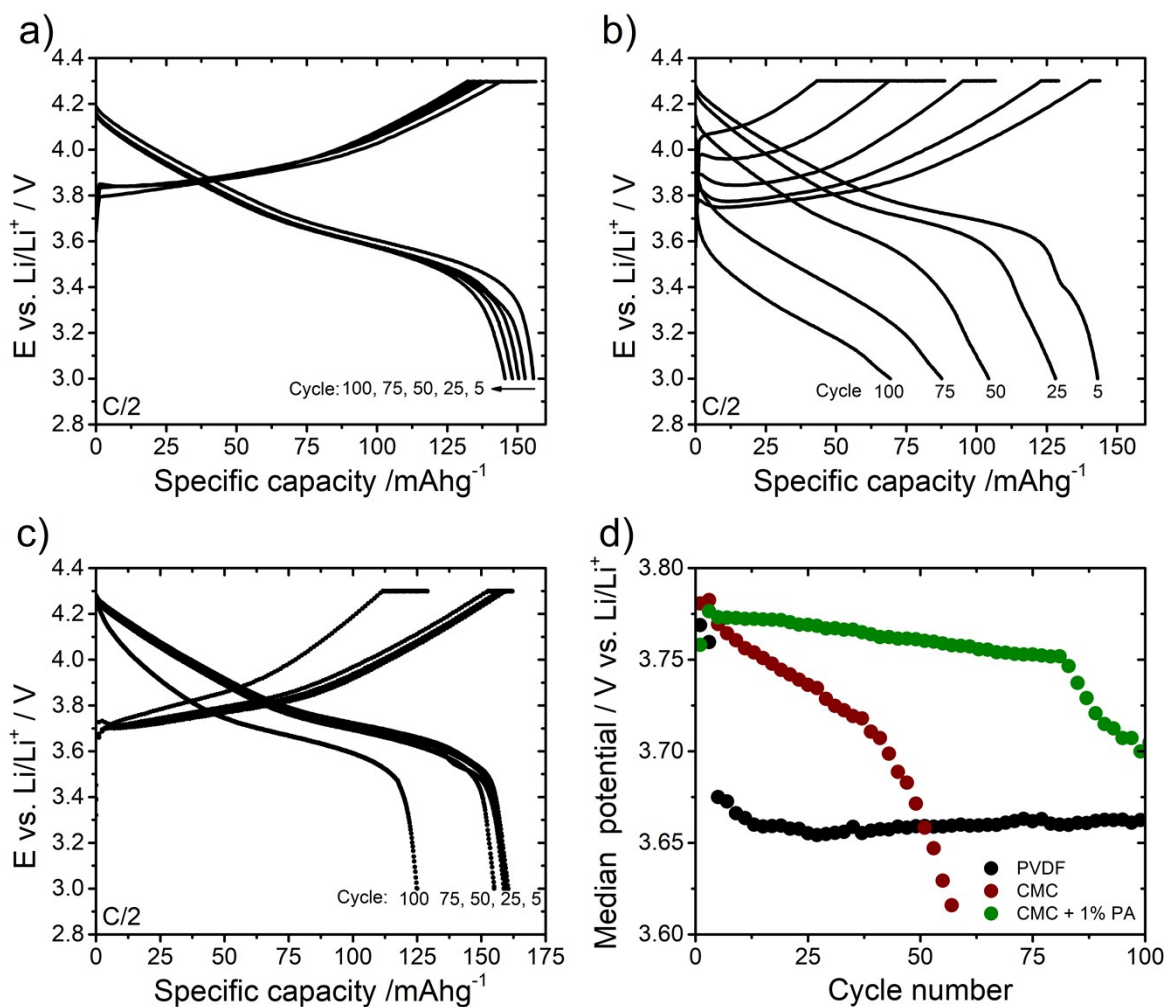


Figure S2. Capacity vs voltage for cycles 5,25,50,75, and 100 of electrodes utilising binders of a) PVDF, b) CMC, and c) CMC+1%PA. Plot d) shows the evolution of the median discharge potential for these electrodes. Note that the data in c) is from "cell 2" as depicted in figure 1 of the main text.

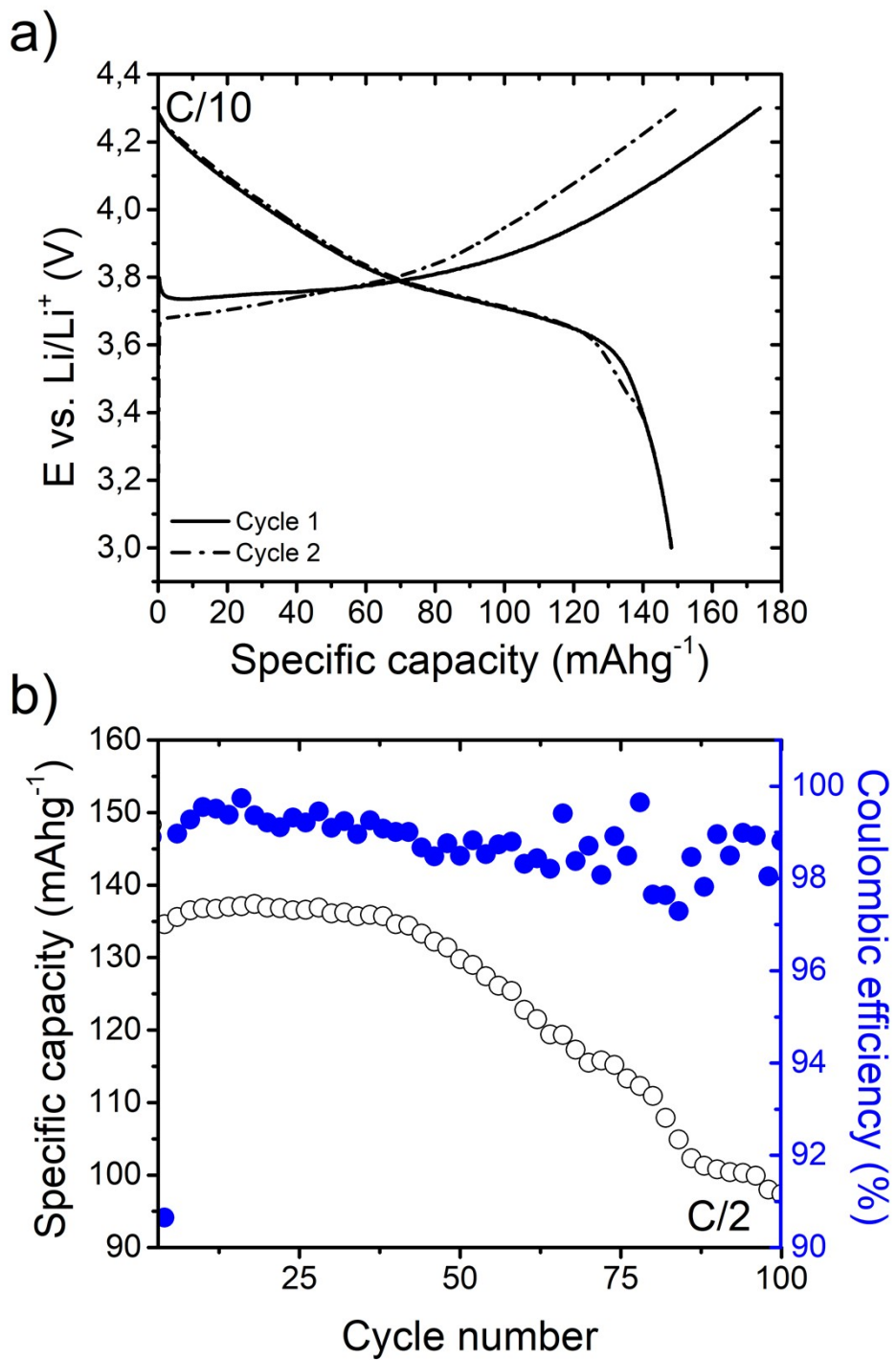


Figure S3. Cycling data performance of an electrode incorporating CMC + 1%PA, dried under vacuum at 170 °C. (a) First and second cycle voltage vs capacity behaviour. (b) Capacity and coulombic efficiency evolution with cycle number

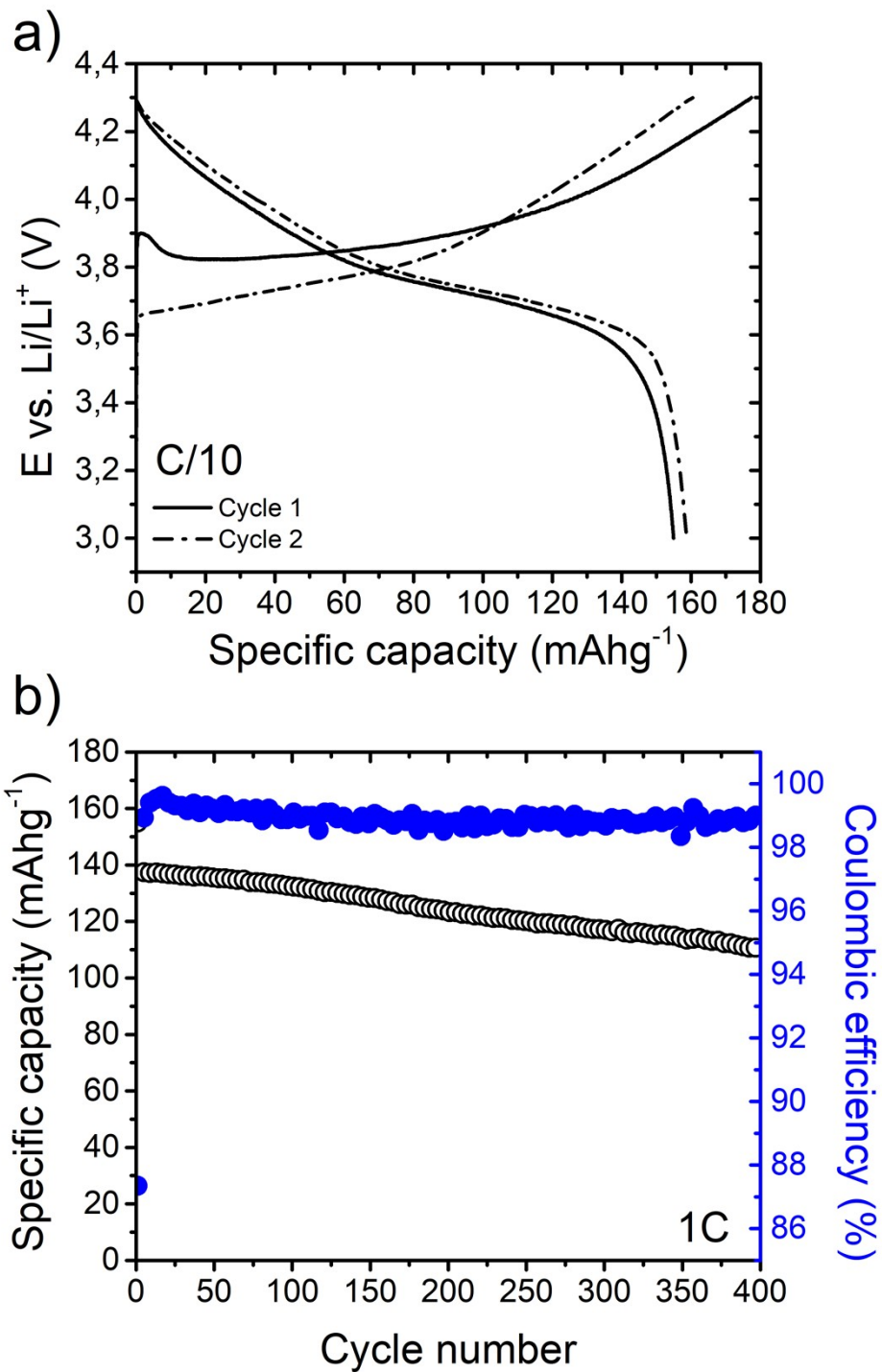


Figure S4. Cycling data performance of an electrode incorporating CMC + 0.5%PA, dried under vacuum at 90 °C and washed with absolute ethanol. (a) First and second cycle voltage vs capacity behaviour. (b) Capacity and coulombic efficiency evolution with cycle number

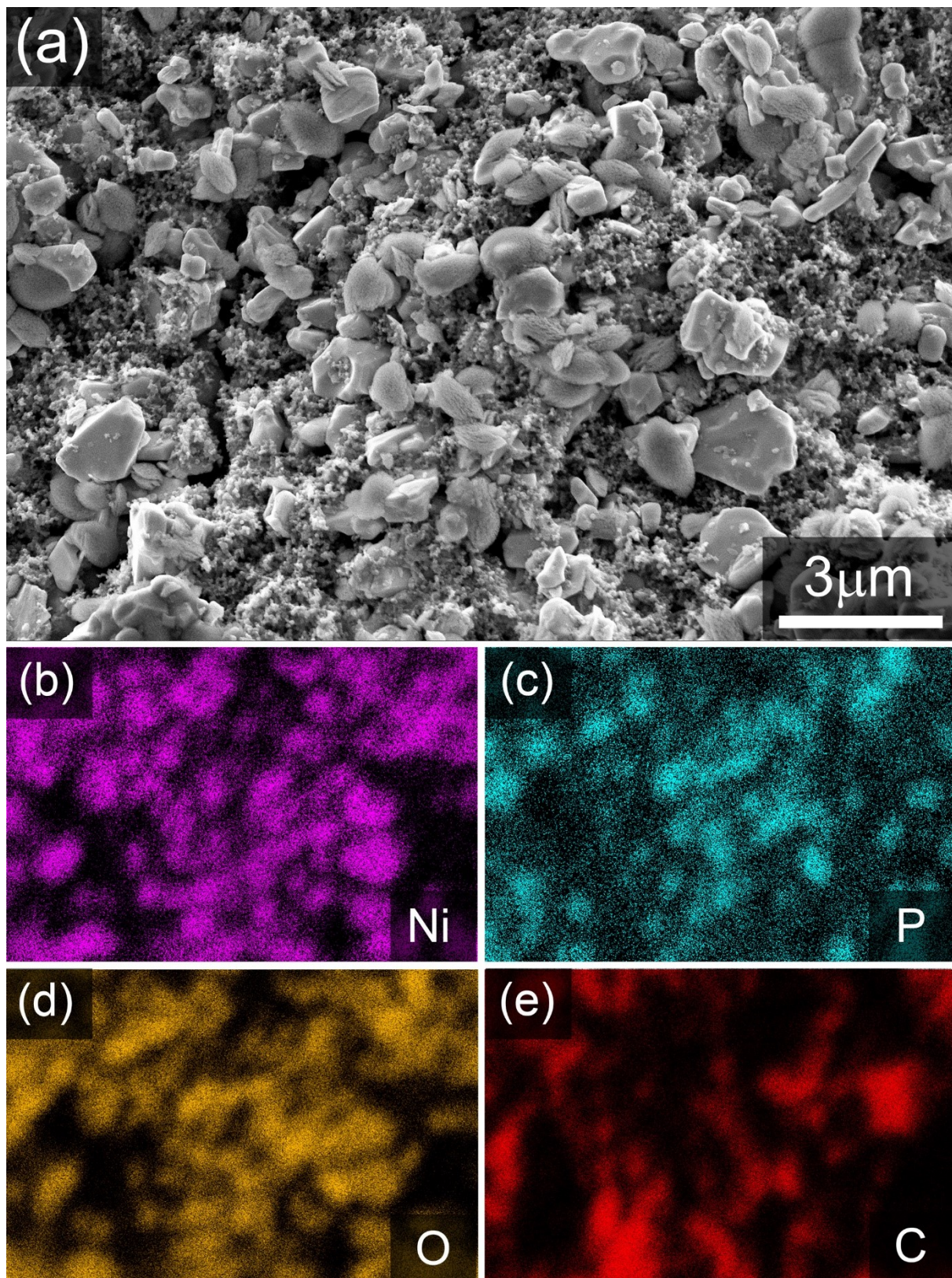


Figure S5. (a) Secondary electron image of an electrode incorporating CMC and 1% phosphoric acid, after drying at 90 °C in air, and (b-e) associated EDS maps

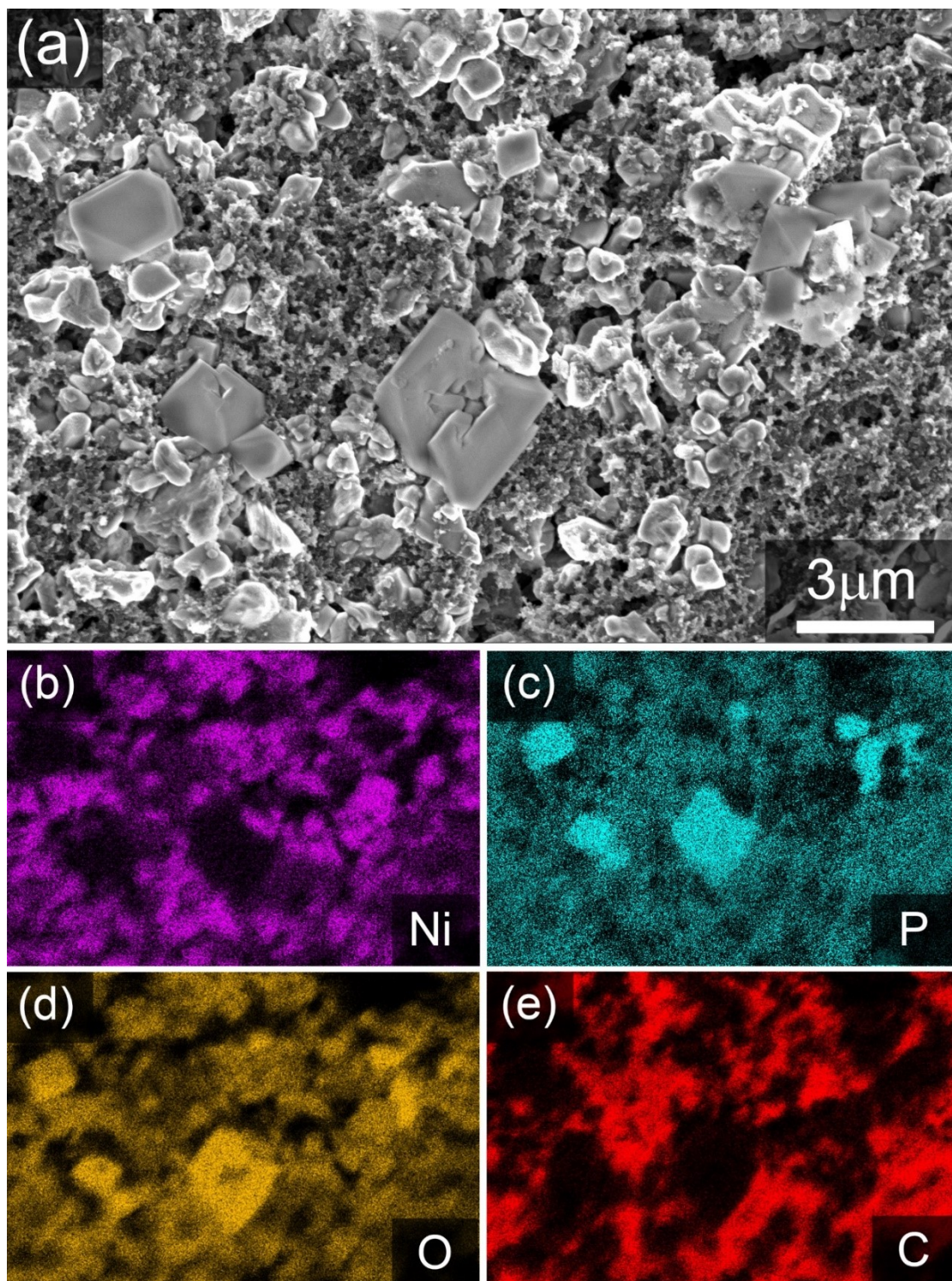


Figure S6. (a) Secondary electron image of an electrode incorporating CMC and 1% phosphoric acid, after drying at 170 °C in air, and (b-e) associated EDS maps

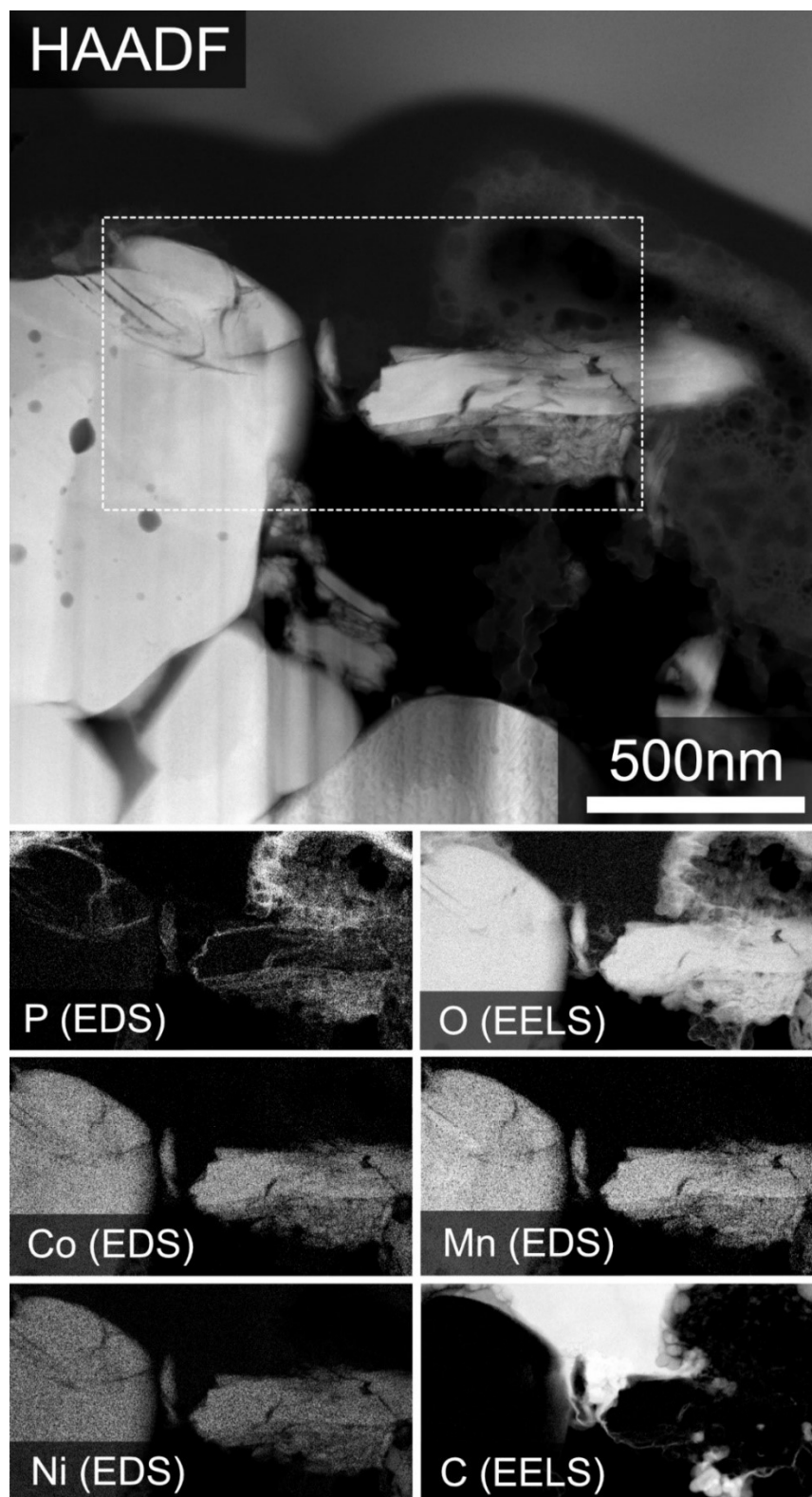


Figure S7. High Angle Annular Dark Field (HAADF) image of the surface of an electrode containing 1% phosphoric acid, with associated element maps collected via EDS or EELS (as labelled)



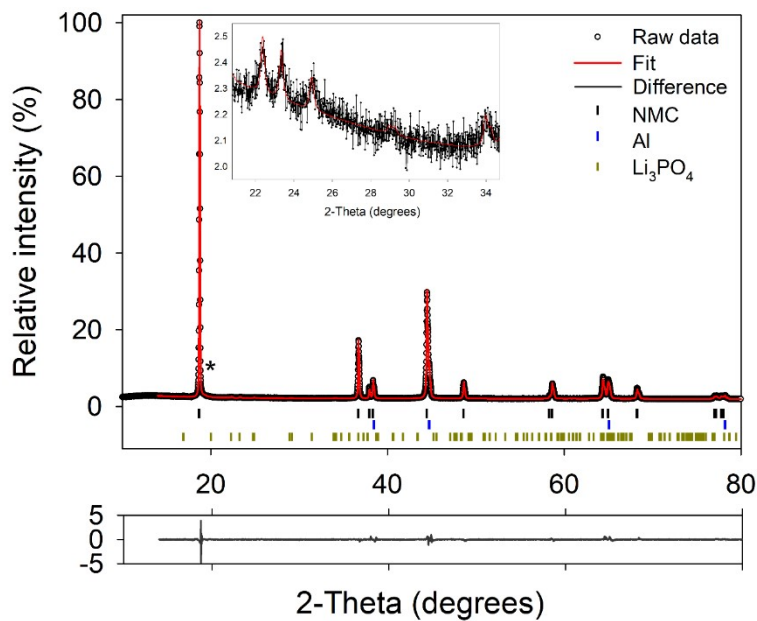


Figure S8 – Fitted X-ray diffractogram of an electrode incorporating CMC and 1%PA after vacuum drying at 90 °C. Inset is a close-up of the 21-35 degrees  $2\theta$  region showing the fit to  $\text{Li}_3\text{PO}_4$ . The location of the most significant reflection associated with CMC crystallinity is marked with "\*".

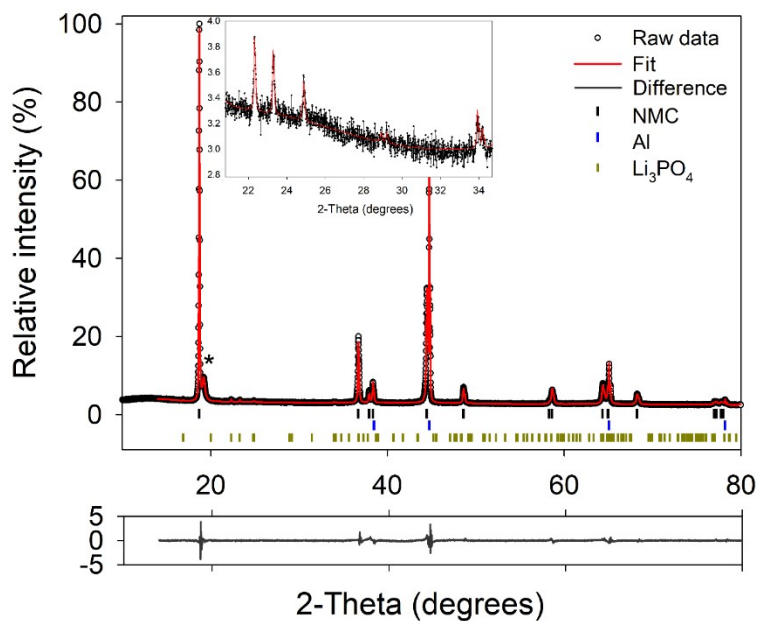


Figure S9 - Fitted X-ray diffractogram of an electrode incorporating CMC and 1%PA after vacuum drying at 170 °C. Inset is a close-up of the 21-35 degrees  $2\theta$  region showing the fit to  $\text{Li}_3\text{PO}_4$ . The location of the most significant reflection associated with CMC crystallinity is marked with "\*".