Electronic Supplementary Material (ESI) for Nanoscale.

Supplementary Information

High-Rate Potassium Ion and Sodium Ion Batteries by Co-Intercalation Anodes and Open Framework Cathodes

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KEYWORDS: co-intercalation, graphite, prussian blue, open framework cathodes, potassium ion batteries, sodium ion batteries, fast charging

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Figure S1

Prussian Blue (Na) Synthesis

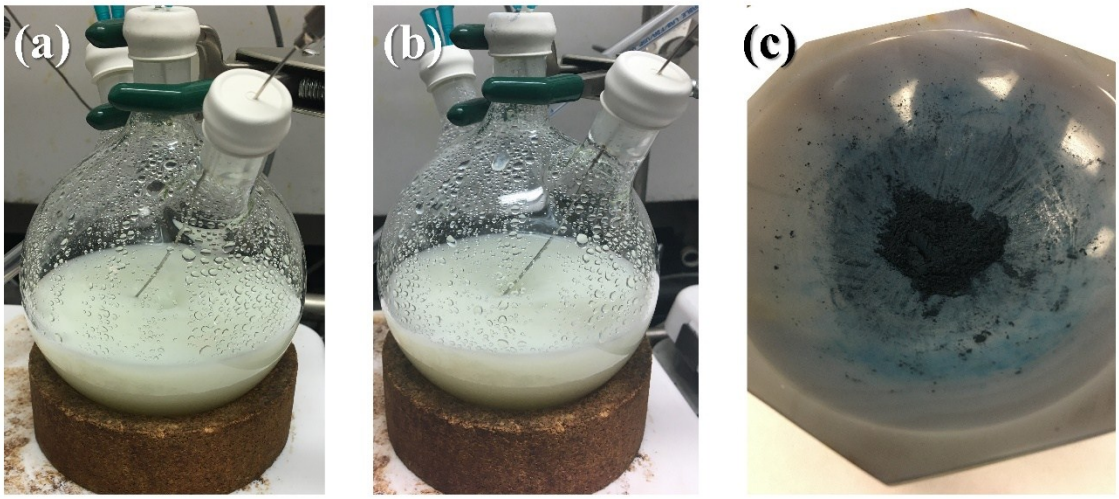

Figure S1: Experimental images of NaPB synthesis after all precursors were added at (a) t = 0 hours, (b) t = 4 hours, (c) and the resulting product.

Figure S2

Prussian Blue (K) Synthesis

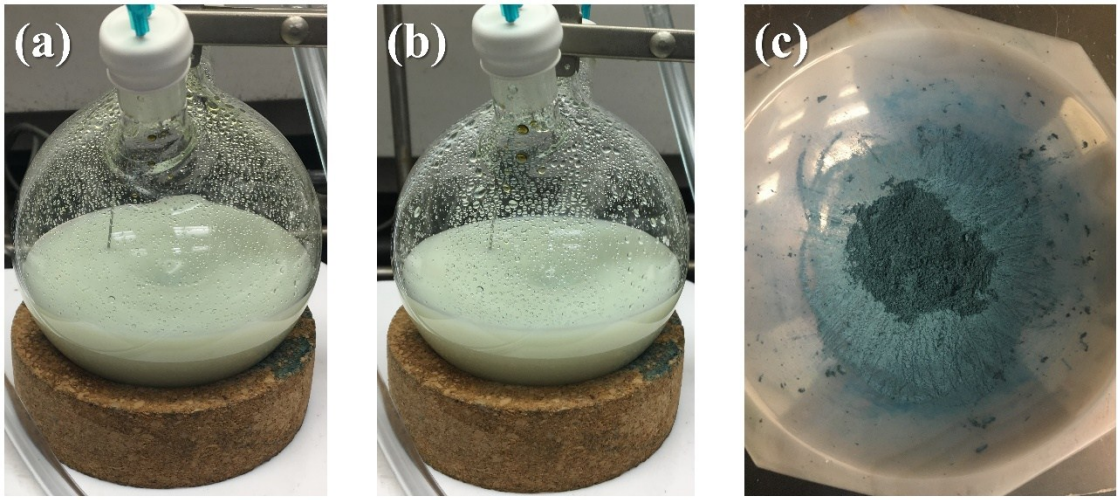

Figure S2: Experimental images of KPB synthesis after all precursors were added at (a) t = 0 hours, (b) t = 4 hours, (c) and the resulting product.

Figure S3

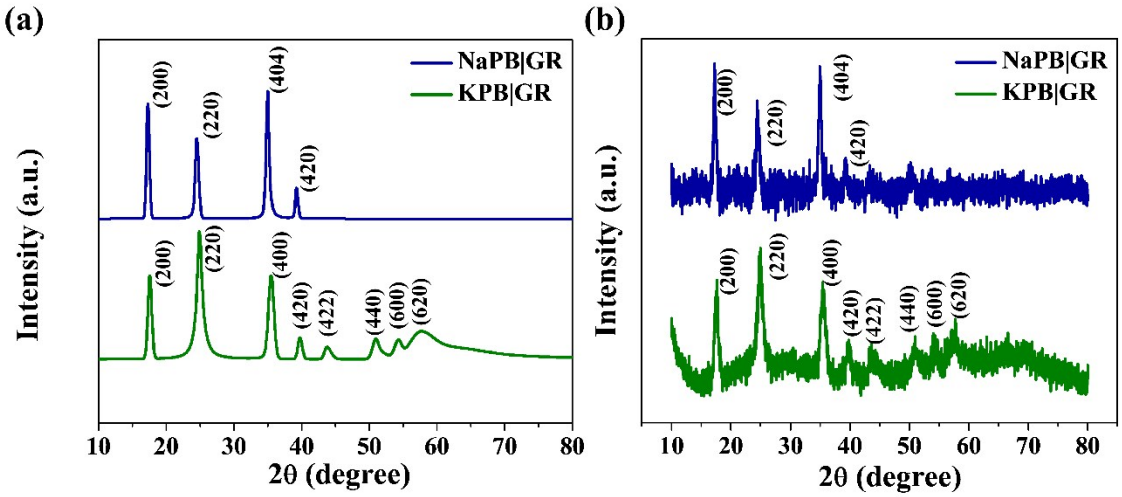

Figure S3: XRD of synthesized NaPB and KPB: (a) smoothed and (b) unsmoothed data.

Figure S4

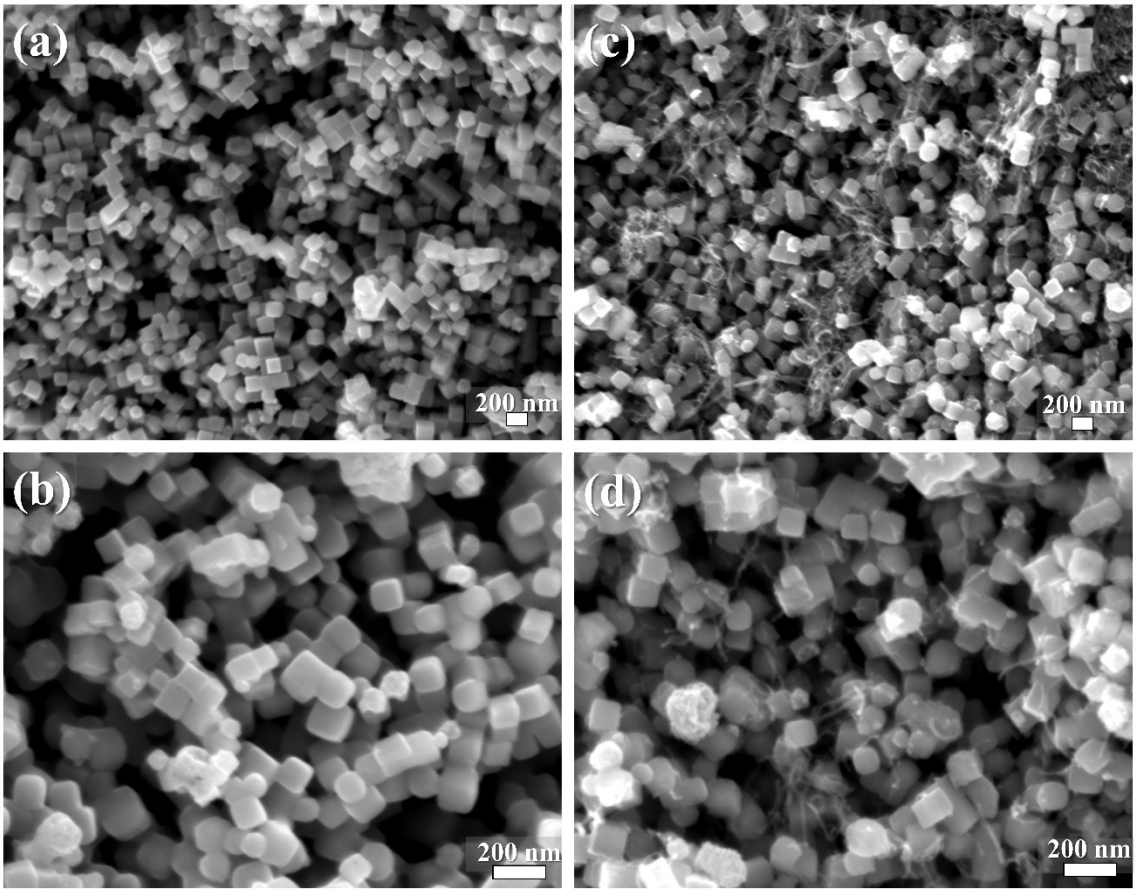

Figure S4: Scanning electron microscopy images of (a), (b) synthesized NaPB and (c), (d) synthesized NaPB with multiwall carbon nanotubes.

Figure S5

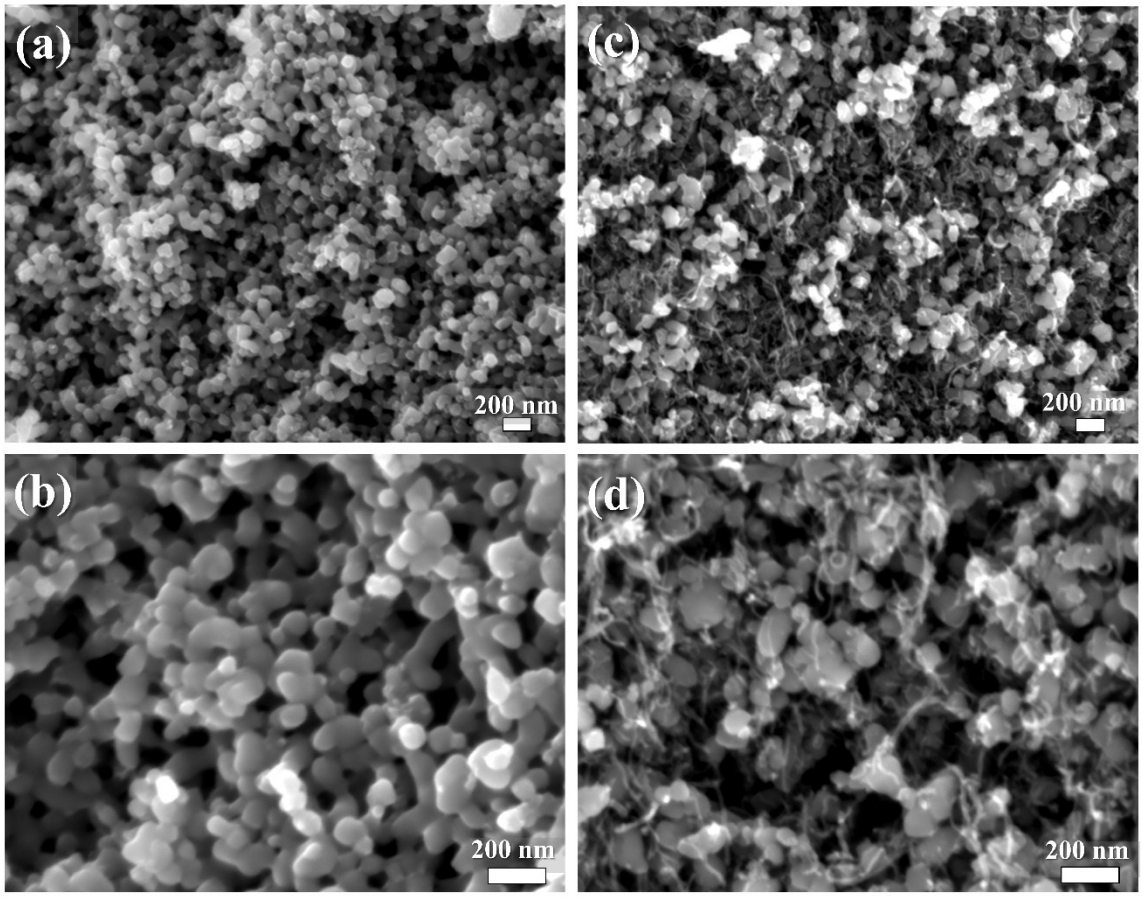

Figure S5: Scanning electron microscopy images of (a), (b) synthesized KPB and (c), (d) synthesized KPB with multiwall carbon nanotubes.

Figure S6

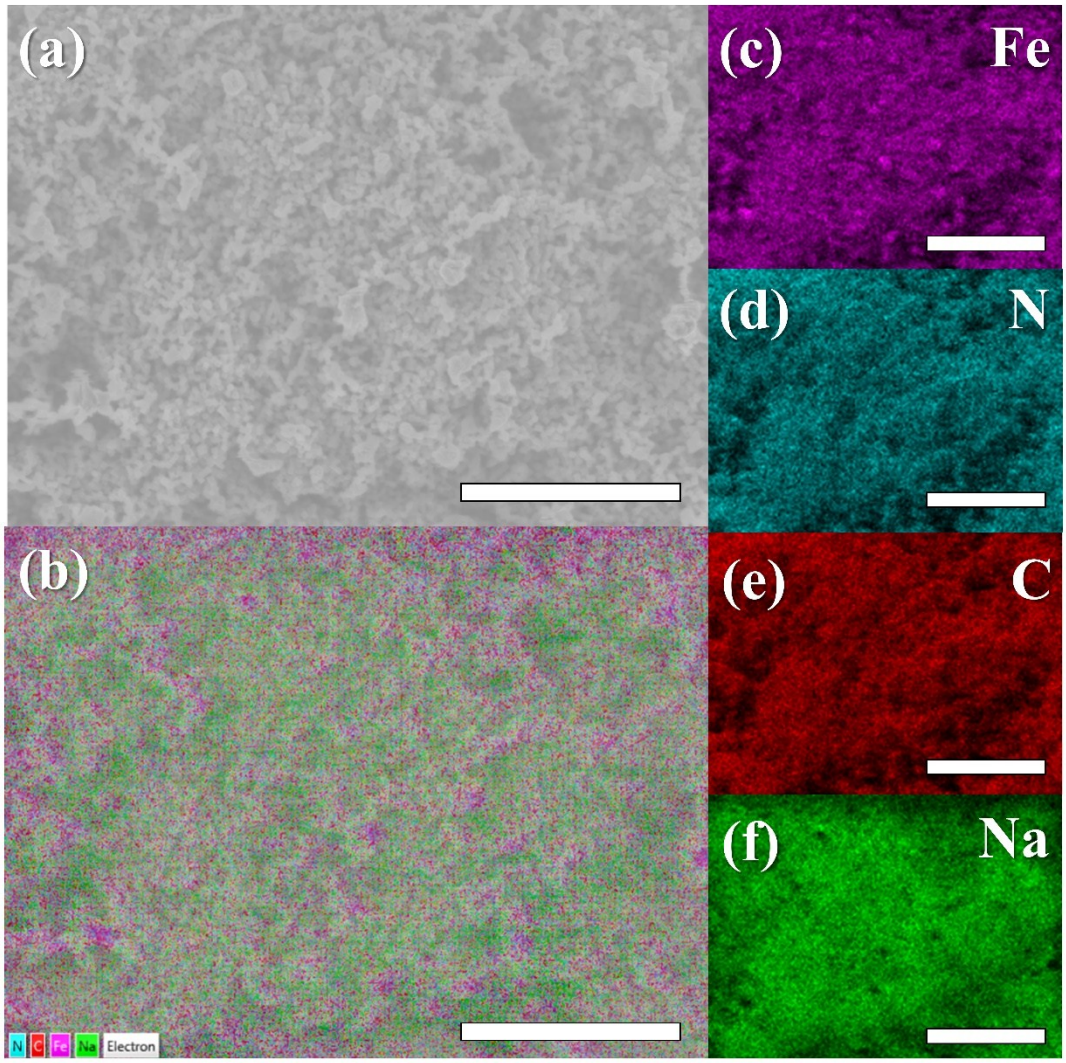

Figure S6: Elemental analysis of synthesized NaPB all with scale bat of 5 µm (a) electron image, (b) all elements, (c) iron, (d) nitrogen, (e) carbon, (f) sodium.

Figure S7

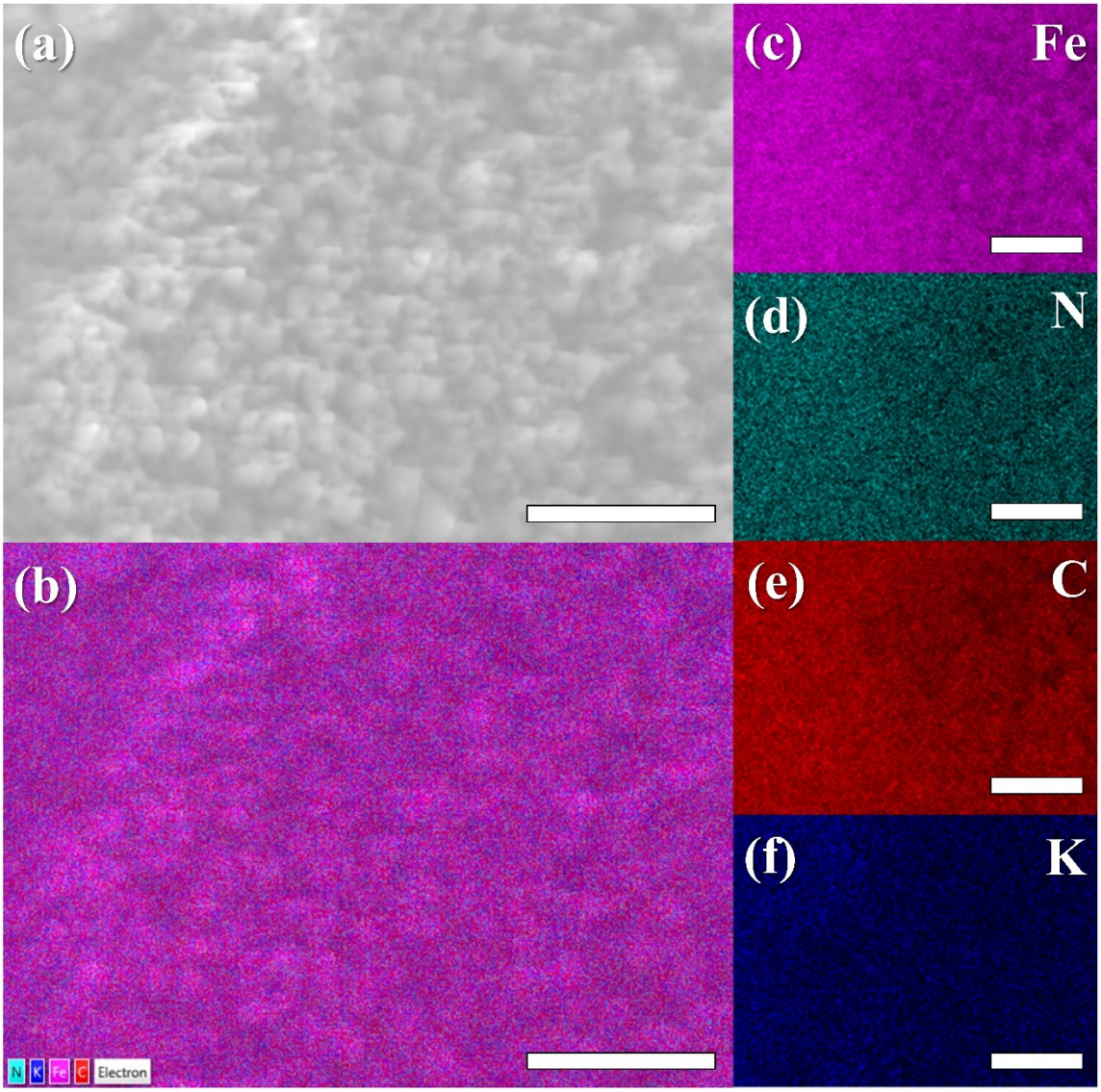

Figure S7: Elemental analysis of synthesized KPB all with scale bat of 1 μm (a) electron image, (b) all elements, (c) iron, (d) nitrogen, (e) carbon, (f) potassium.

Figure S8

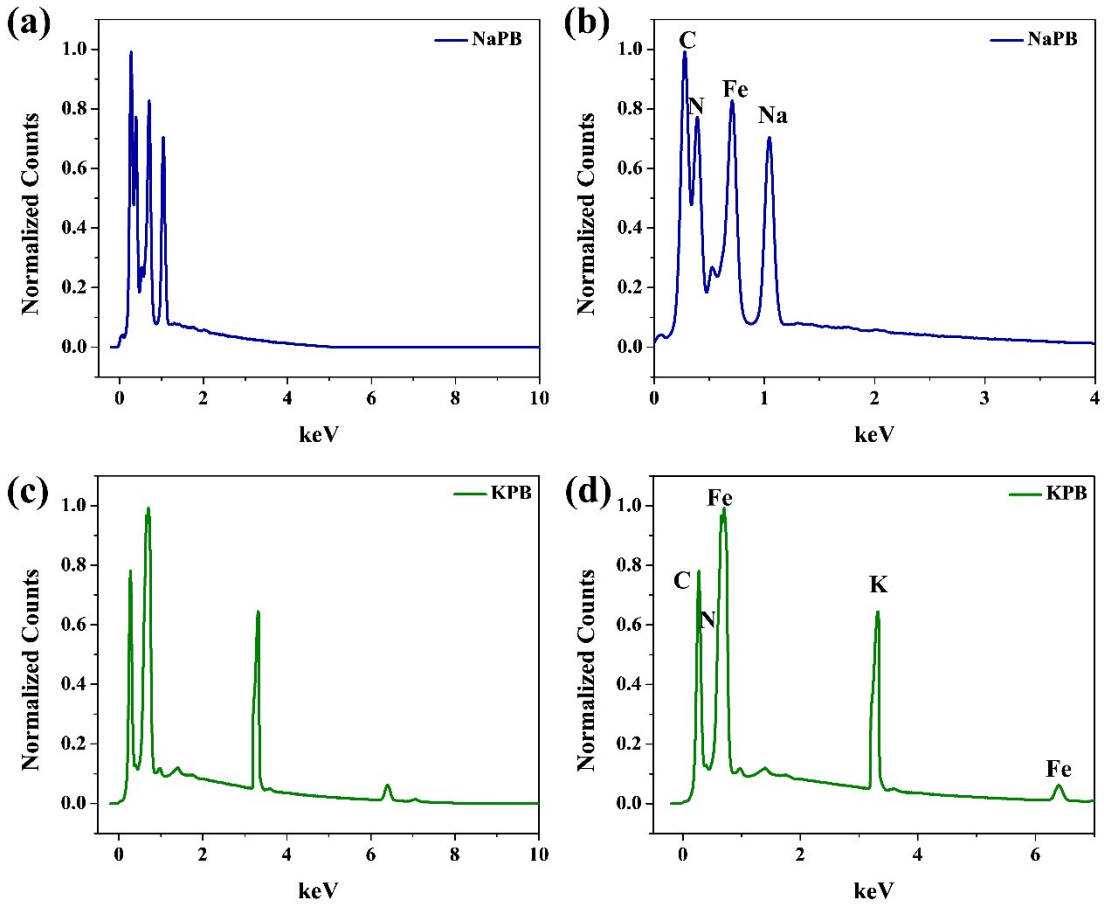

Figure S8: Energy dispersive x-ray spectroscopy for elemental analysis of the Prussian blue analogues (a), (b) NaPB and (c), (d) KPB.

Figure S9

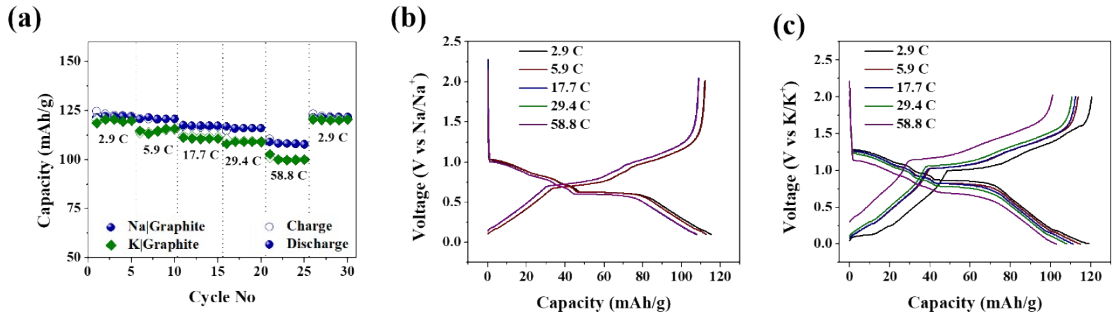

Figure S9: Electrochemical data from Na|GR and K|GR half cells (a) rate study, and galvanostatic charge discharge curves of the first cycle at each rate of the rate study for (b) Na|GR, and (c) K|GR.

Figure S10

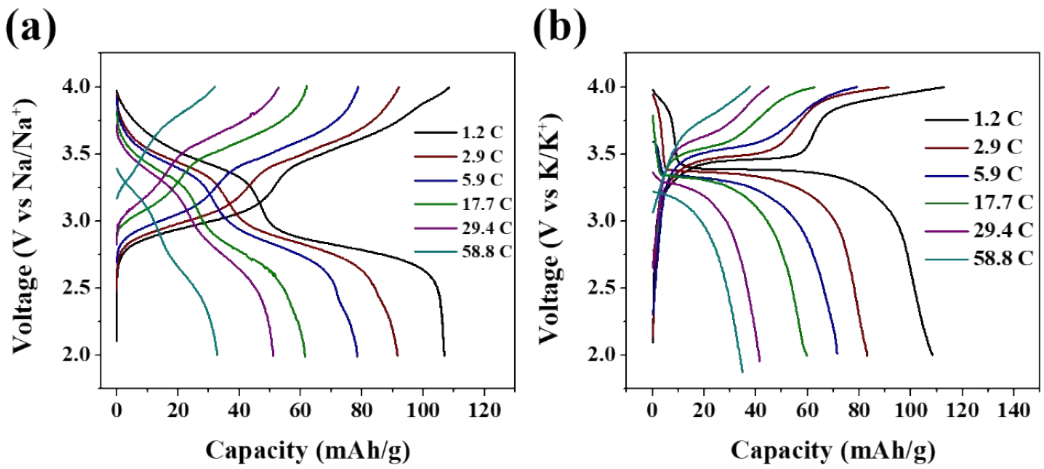

Figure S10: Electrochemical data from Na|PB and K|PB half cells, galvanostatic charge discharge curves of the first cycle at each rate of the rate study for (a) Na|PB, and (b) K|PB.

Figure S11

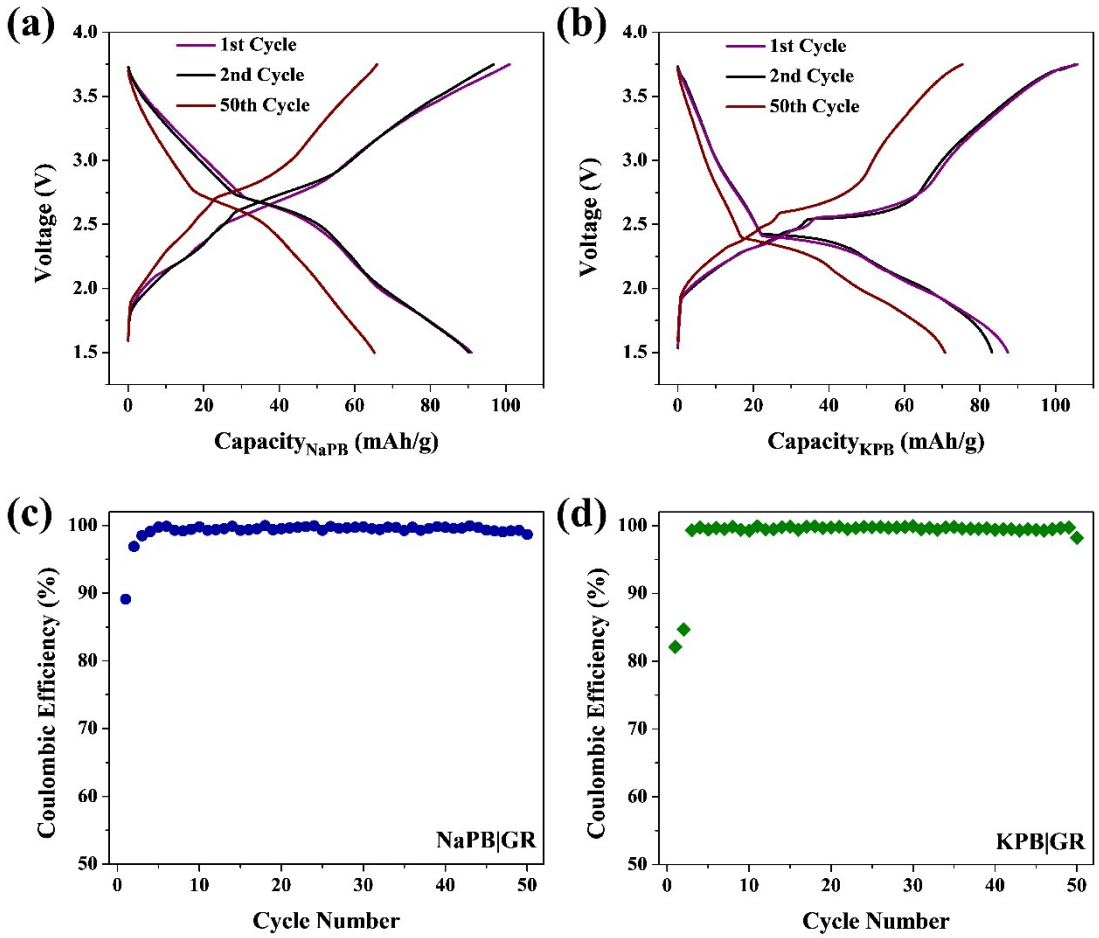

Figure S11: Electrochemical data from NaPB|GR and KPB|GR full cells, galvanostatic charge discharge curves of the first, second, and last (50^{th}) cycles at 1.2 C for (a) NaPB|GR, and (b) KPB|GR, and corresponding coulombic efficiencies for (c) NaPB|GR, and (d) KPB|GR.

Figure S12

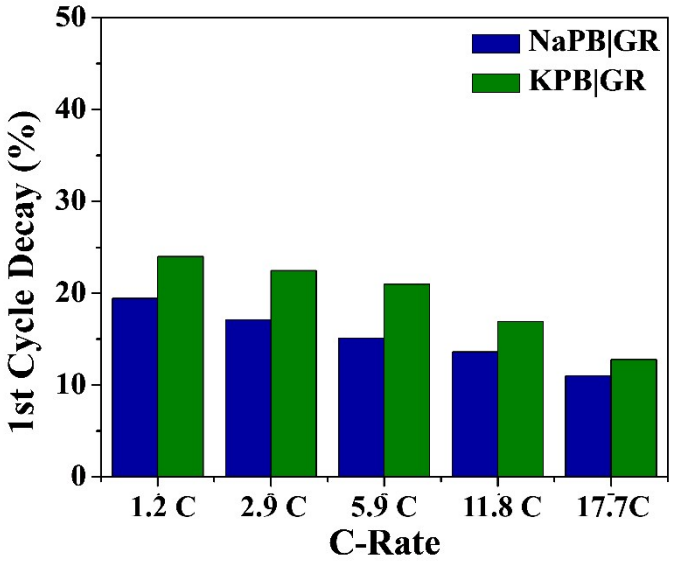

Figure S12: 1st cycle decay for both NaPB|GR and KPB|GR full cells.

Figure S13

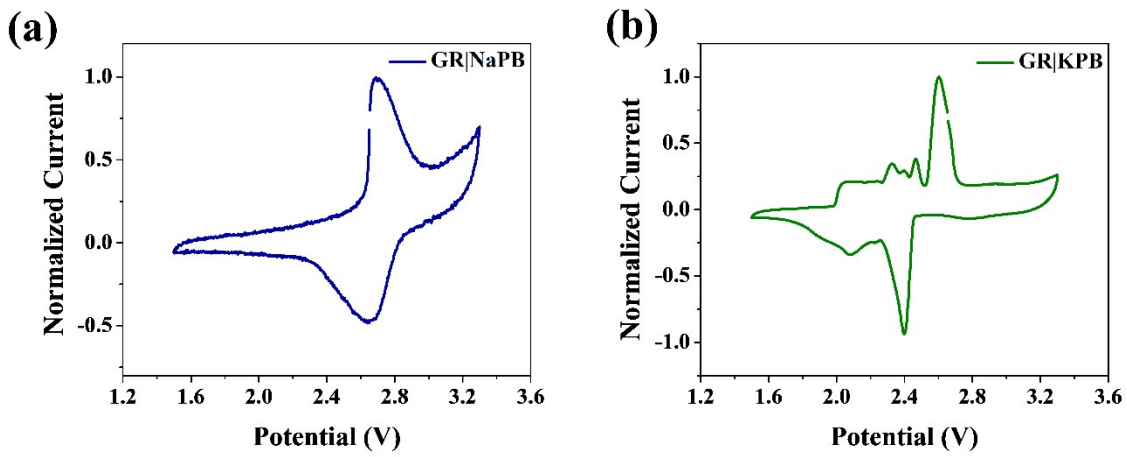

Figure S13: Cyclic voltammetry of (a) GR|NaPB and (b) GR|KPB full cells.

Figure S14

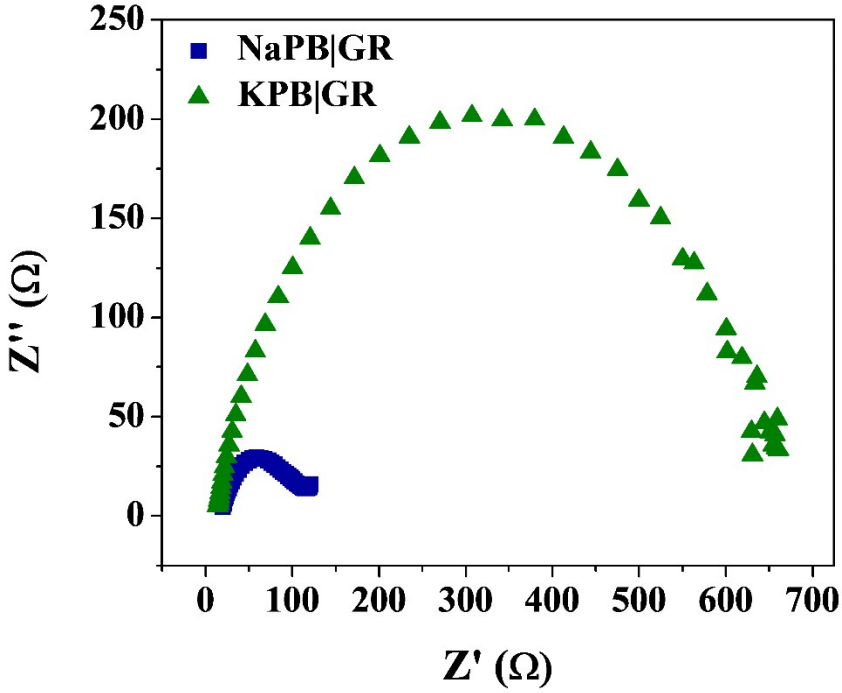

Figure S14: EIS data of full cells NaPB|GR and KPB|GR.