

## Supplementary Information

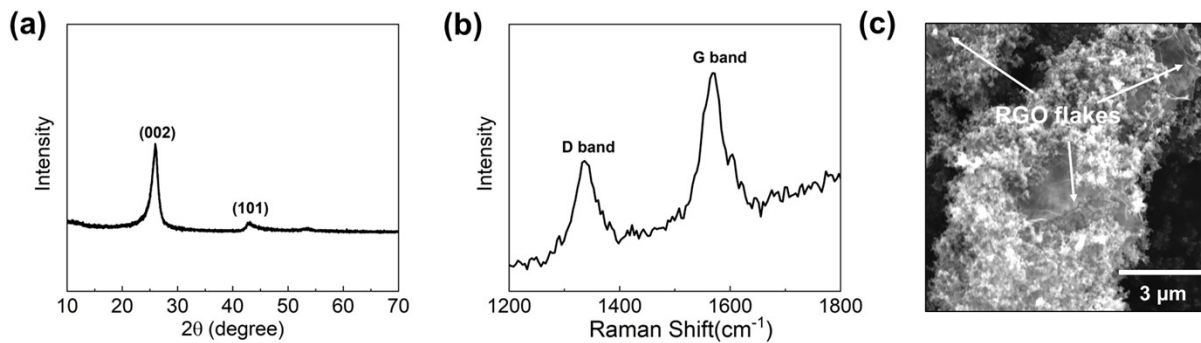
### Conductive carbon embedded beneath cathode active material for longevity of solid-state batteries

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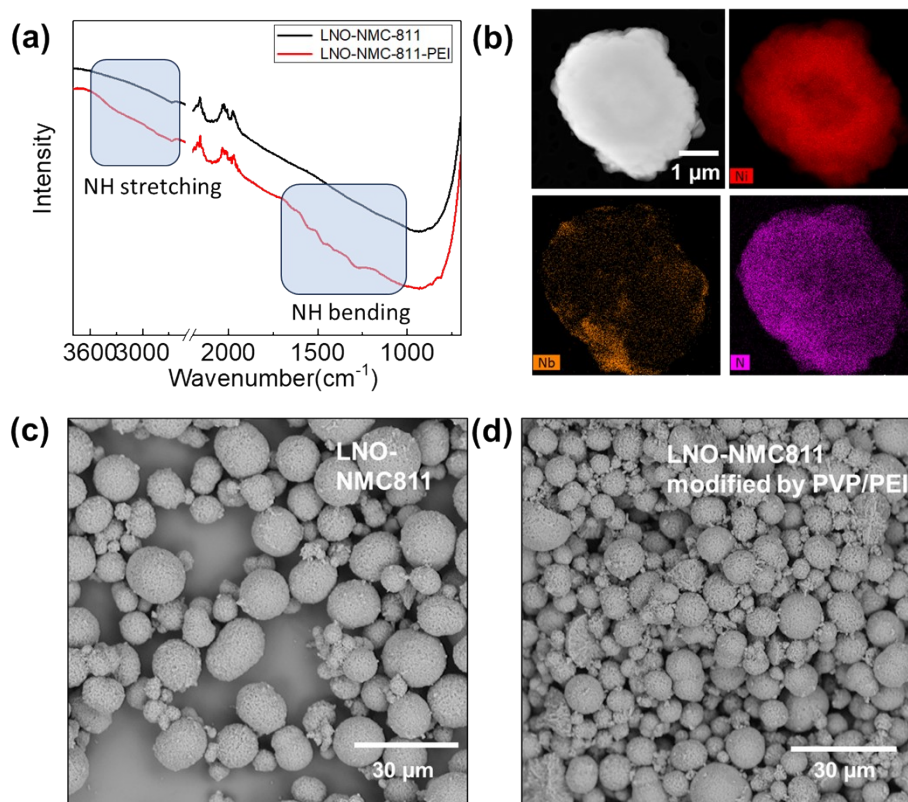
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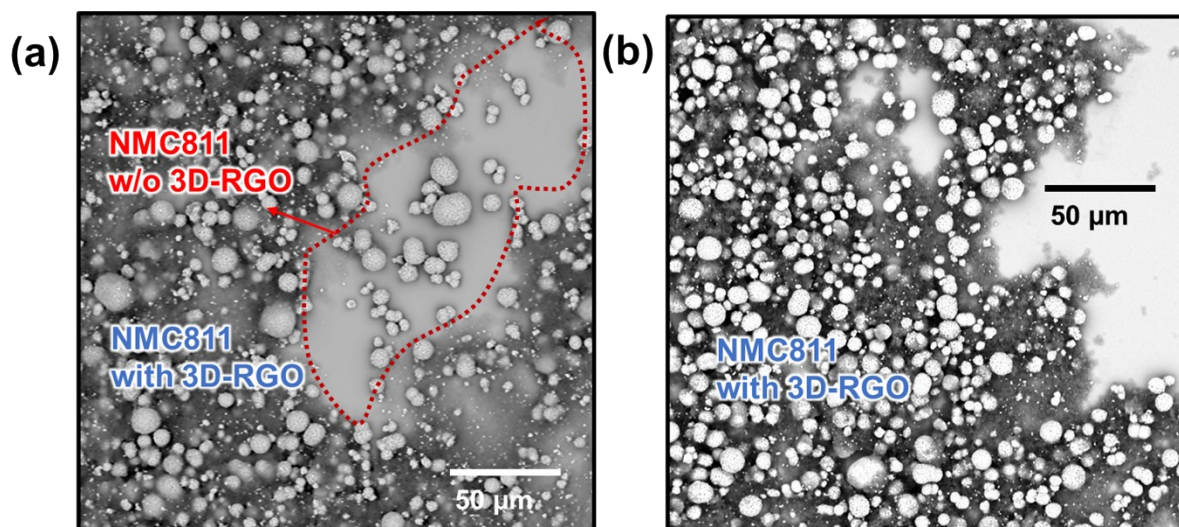
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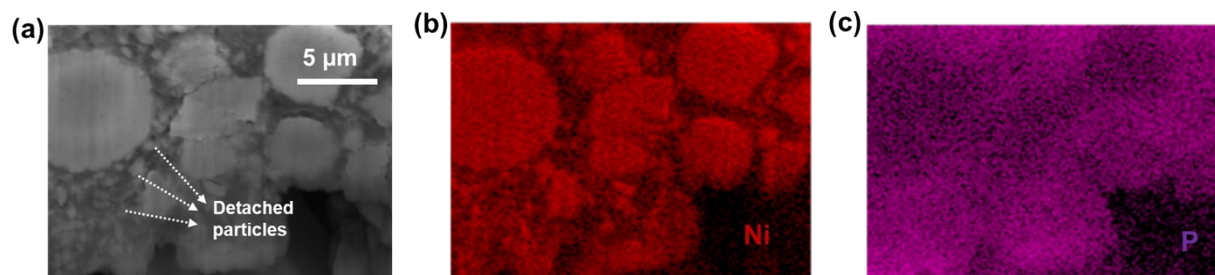
**Supplementary Figure S1.** (a) XRD pattern, (b) Raman spectrum, and (c) SEM image of 3D RGO framework.



**Supplementary Figure S2.** (a) IR, (b) STEM-HAADF image and EDS elemental mappings, and (c–d) SEM images of PEI-coated pc-NMC811.



**Supplementary Figure S3.** SEM images of pc-NMC811/RGO composites (a) without and (b) with PEI coating on p



**Supplementary Figure S4.** Cross-sectional SEM images of a composite cathode consisting of pc-NMC811/RGO and LPSCI SE. (a) SEM image and EDS mapping of (b) Ni (representing pc-NMC811) and (c) P (representing LPSCI).