

Table S1. The content of the pitch calculated using the density difference.

| | True density (g/ml) | *Pitch contents (%) |
|----------------|------------------------|------------------------|
| FG | 2.310 | 0 |
| CFG5 | 2.289 | 4.10 |
| CFG10 | 2.274 | 7.03 |
| CFG15 | 2.265 | 8.92 |
| CFG20 | 2.245 | 13.00 |
| Pitch (900 °C) | 1.810 | 100 |

* [density of FG - density of samples]/[density of FG - density of pitch (900 °C)]

Table. S2. Elemental analysis of coating pitch.

| | Carbon | Hydrogen | Nitrogen | Sulfur |
|--------|--------|----------|----------|--------|
| Raw | 93.39 | 5.45 | 0.012 | 0.090 |
| 900 °C | 96.48 | 0.69 | 0.077 | 0.059 |

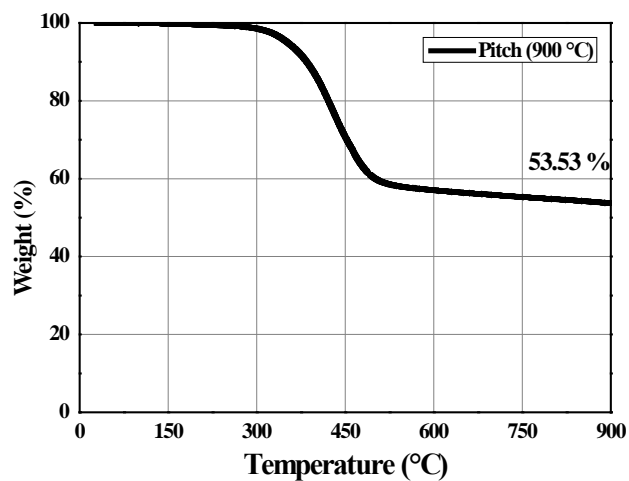


Figure S1. Thermal behavior of coating pitch in N₂ atmosphere.

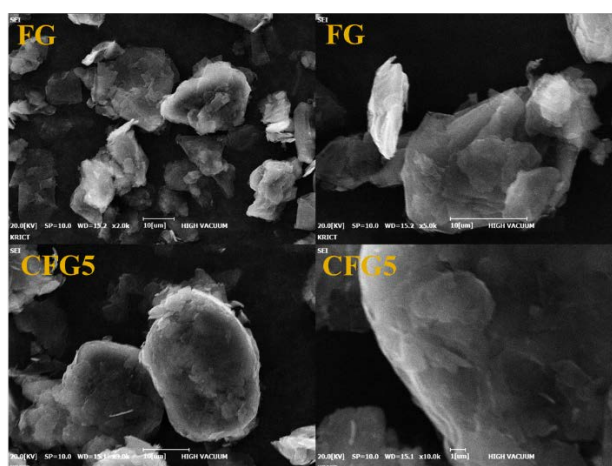


Figure S2. SEM images of FG and CFG5.

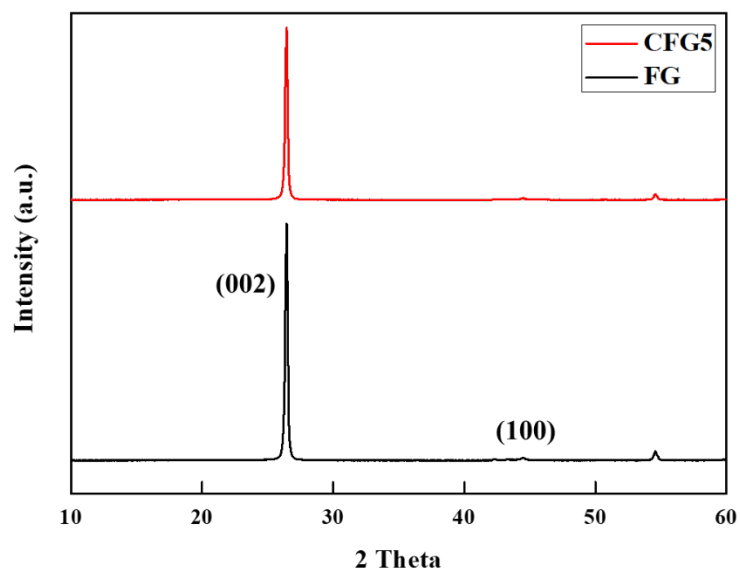


Figure S3. XRD of FG and CFG5.

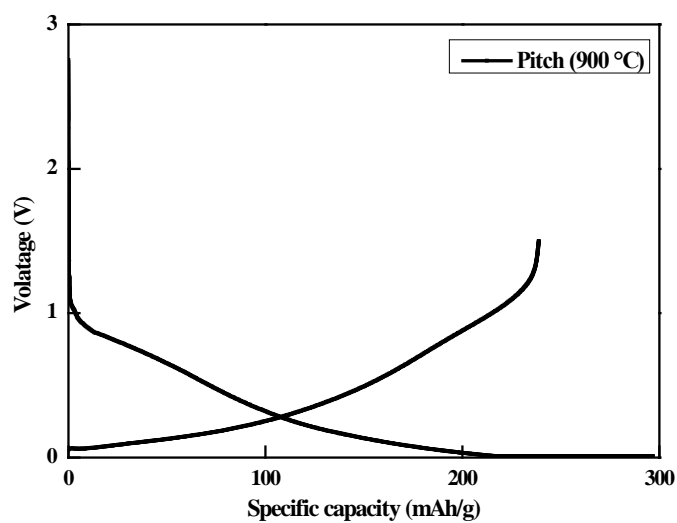


Figure S4. Galvanostatic charge/discharge (GDC) of pyrolyzed pitch at the first cycle.

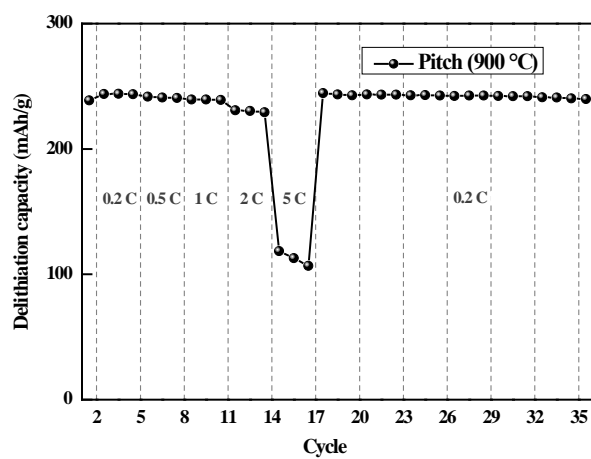


Figure S5. Rate performance at various delithiation rates of pyrolyzed pitch and cycling stability.

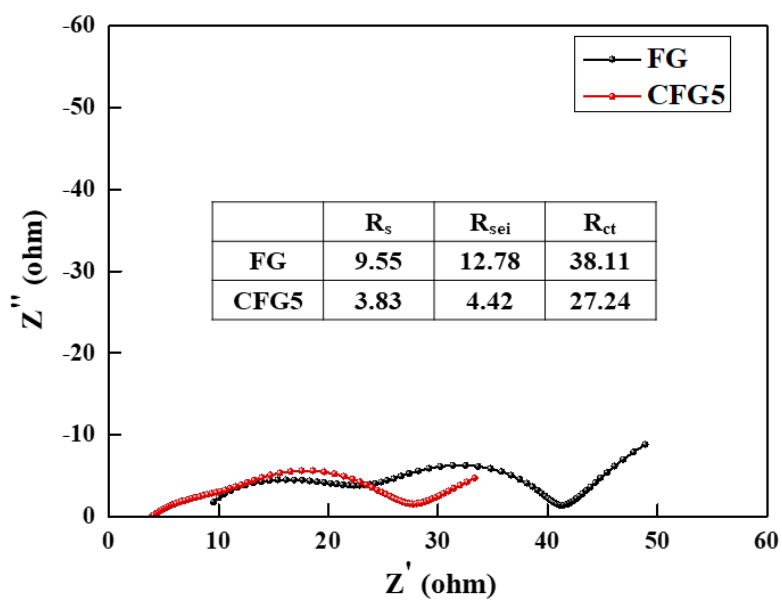


Figure S6. EIS curves after cycling of FG and CFG5.

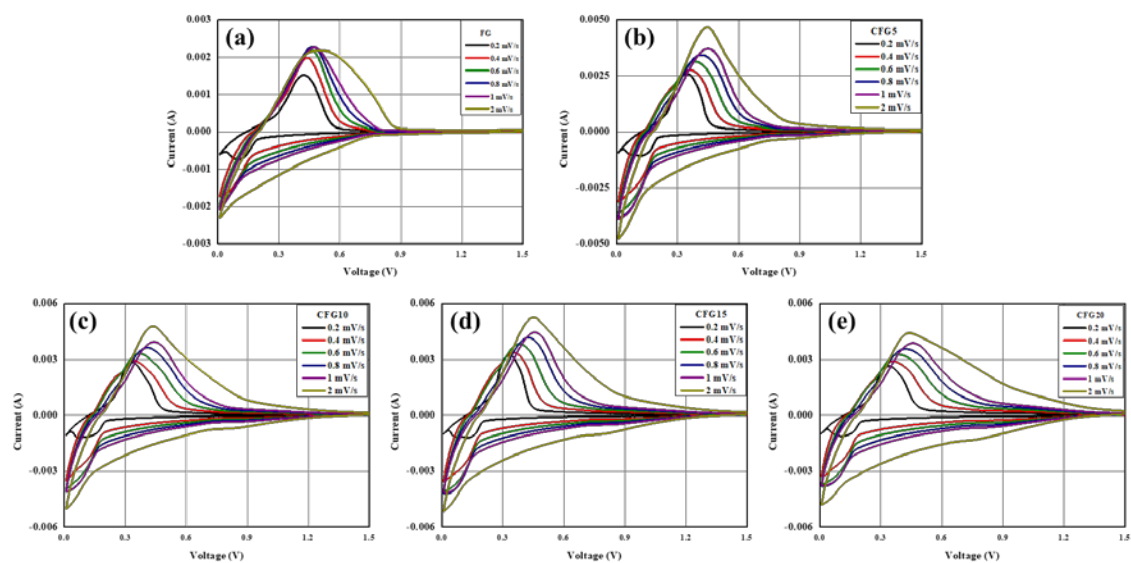


Figure S7. Cyclic voltammograms at different scan rates of (a) FG, (b) CFG5, (c) CFG10, (d) CFG15, and CFG20.

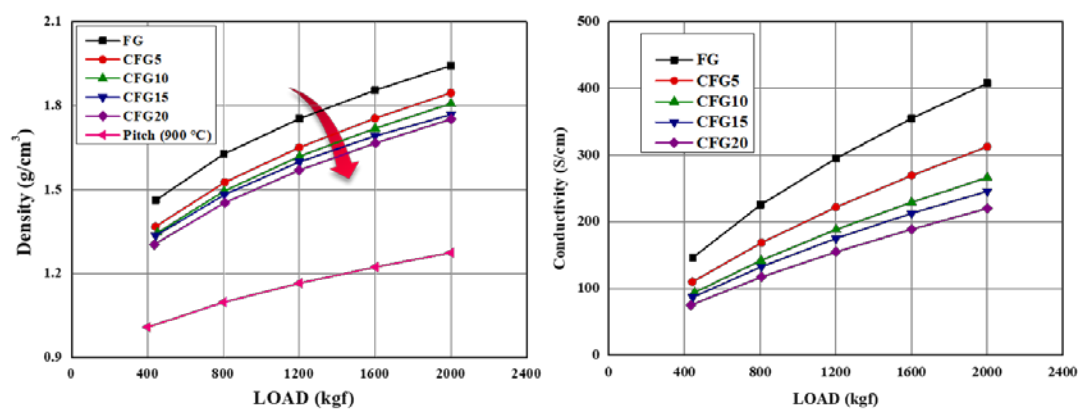


Figure S8. Influence of (a) density and (b) electronic conductivity as a load (kgf).

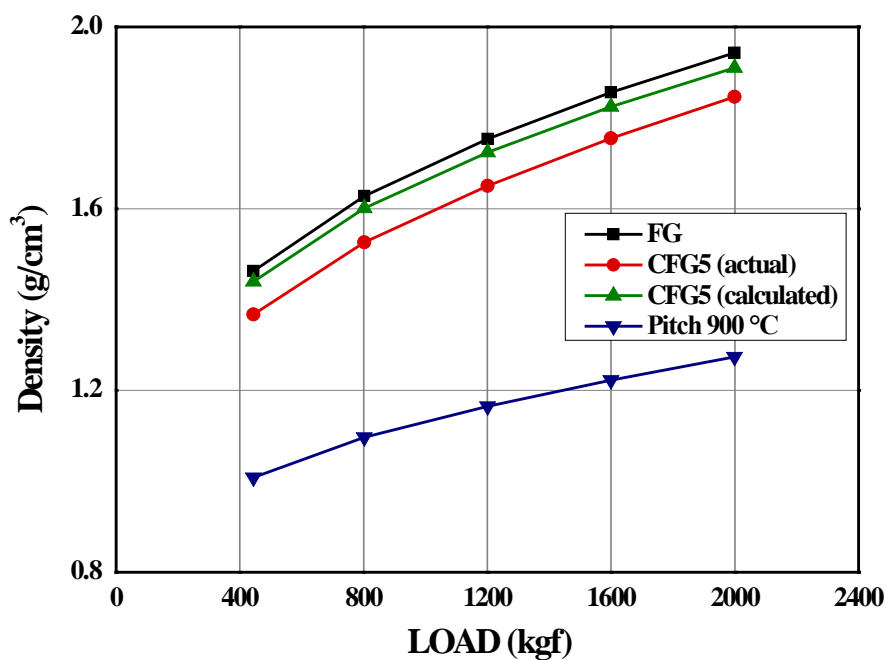


Figure S9. Actual density and the calculated density of CFG5 and actual density of FG and pyrolyzed pitch according to the load.

Table. S3. Actual density and the calculated density according to the load.

| LOAD (kgf) | Packing density (g/cm ³) | | | | | | | |
|---------------|--------------------------------------|----------------------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|
| | CFG5 | | CFG10 | | CFG15 | | CFG20 | |
| | Actual value ^a | Calculated value ^b | Actual value | Calculated value | Actual value | Calculated value | Actual value | Calculated value |
| 400 | 1.367 | 1.440 | 1.346 | 1.417 | 1.335 | 1.394 | 1.304 | 1.372 |
| 800 | 1.526 | 1.601 | 1.495 | 1.575 | 1.482 | 1.548 | 1.453 | 1.522 |
| 1200 | 1.651 | 1.724 | 1.619 | 1.695 | 1.599 | 1.666 | 1.569 | 1.636 |
| 1600 | 1.755 | 1.824 | 1.719 | 1.793 | 1.692 | 1.761 | 1.666 | 1.729 |
| 2000 | 1.846 | 1.910 | 1.808 | 1.876 | 1.769 | 1.843 | 1.752 | 1.809 |

^aActual value was measured using a powder resistivity measurement system.

^bCalculated value was estimated by the equation (density of FG at Load) x (weight percent of FG) + (density of Pitch at Load) x (weight percent of pitch).