**Tunable Electronic Properties of Free-standing Fe-doped GaN Nanowires as High-capacity Anode of Lithium-ion Batteries**

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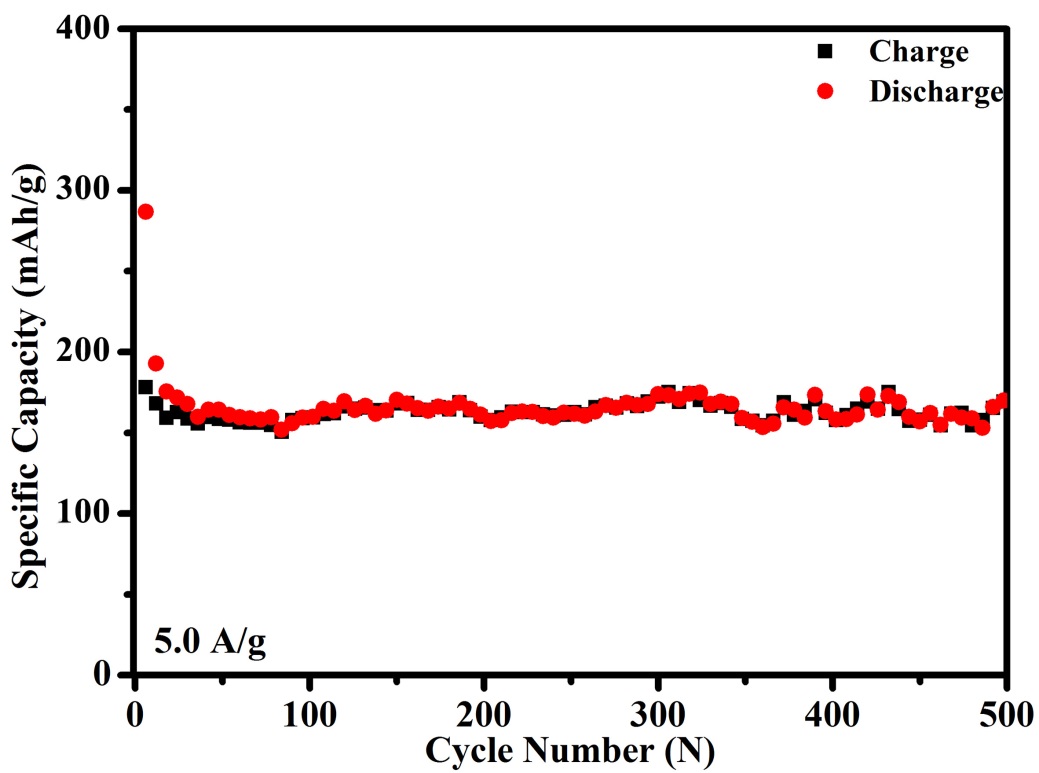
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Fig. S1. Cycling property of intrinsic GaN electrode at 5.0 A g−1.

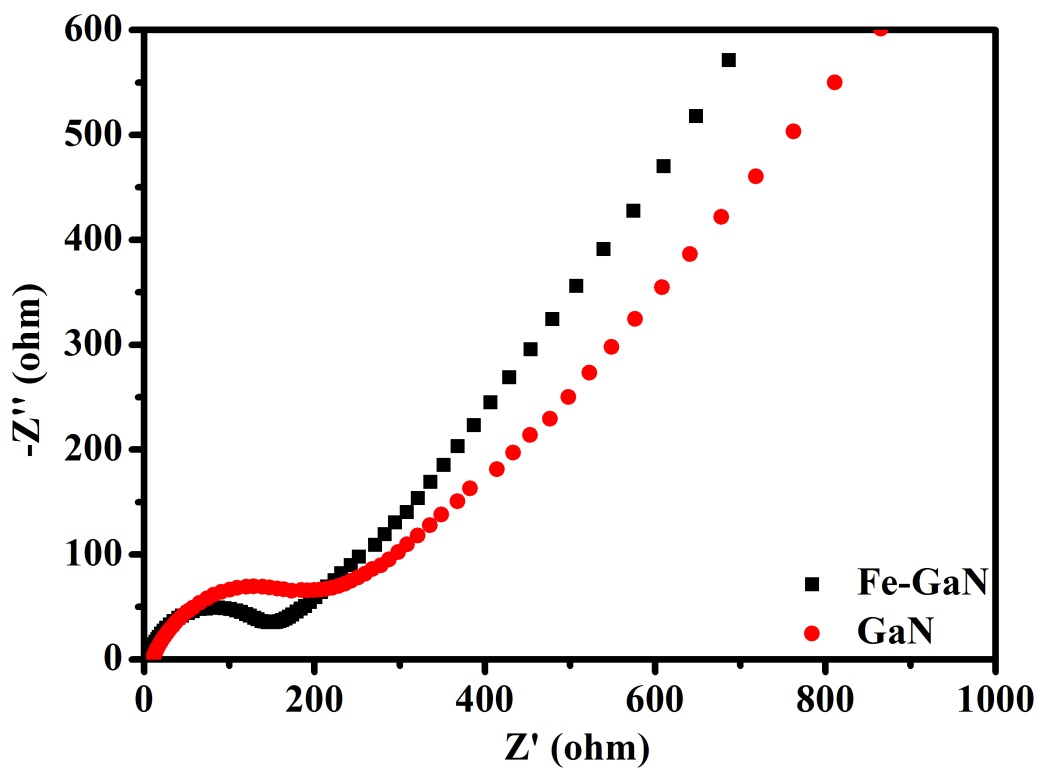
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Fig. S2. Electrochemical impedance spectroscopy (EIS) of intrinsic GaN and Fe-GaN electrodes.

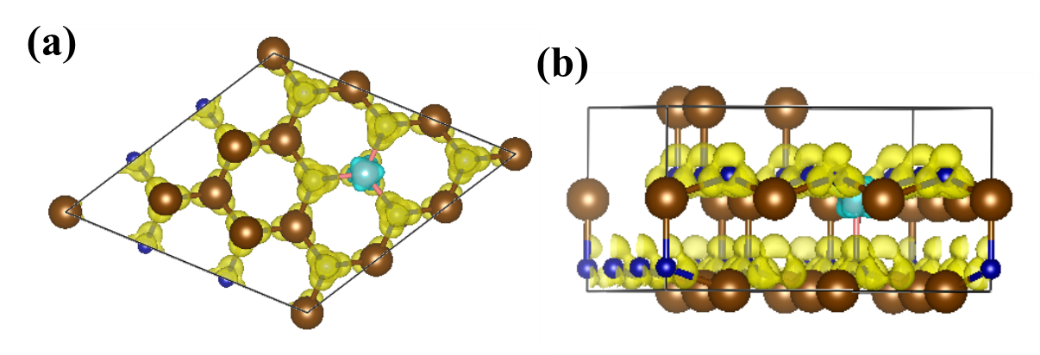
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Fig. S3. Top view (a) and side view (b) of 3D electron density differences of Fe-GaN.

**Table S1.** Comparisons of the synthetic method, morphology, cycle number, current density, and capacity between Fe-GaN electrode and other previously reported metal nitrides-based or gallium compounds-based LIBs electrodes.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Material  (areal loading  and areal) | Method | Morphology | Current density  (mA g−1) | Cycle number | Capacity (mAh g−1) |
| Fe-GaN NWs  (2.7 mg, 1.44 cm2) | CVD | nanowires | 100/5 000 | 200/500 | 612.3/338.2 |
| Ga2S3 ref.[1]  (no mention) | purchase | microparticles | 100 | 20 | ~450 |
| Cu3N ref.[2]  (no mention, 1.0 cm2) | nitrogen-thermal reaction | microparticles | 225 | 400 | 400 |
| Ge3N4/C ref.[3]  (no mention, 2.54 cm2) | hydrothermal | particles | 550 | 300 | ~670 |
| RuN ref.[4]  (no mention, 1.13 cm2) | pulsed magnetron sputtering | thin films | 117 | 70 | 330 |
| Mo2N ref.[5]  (no mention, 1.32 cm2) | ammonia calcination | nanobelts | 100/4000 | 20/10 | ~500/~240 |
| VN ref.[6]  (0.12 mg, 1.0 cm2) | direct current magnetron sputtering | thin films | 230 | 50 | ~800 |
| CoN ref.[7]  (no mention, 2.0 cm2) | amine-thermal reaction | nanoparticles | 250/1000 | 60/60 | ~660/~470 |
| CoN ref.[8]  (0.24 mg, 2.0 cm2) | radio frequency magnetron sputtering | nanoflake | 250/5000 | 80/50 | 1000/690 |
| CrN ref.[9]  (0.14 mg, 1.0 cm2) | radio frequency magnetron sputtering | thin films | 28 μA/cm2 | 30 | ~1200 |
| SiN ref.[10]  (no mention, 1.13 cm2) | pulsed laser deposition | thin films | 1200 | 100 | 700 |
| Mn3N2 ref.[11]  (0.83 mg, 4.0 cm2) | direct current magnetron sputtering | thin films | 80/160 | 110/300 | 463/365.4 |
| Sb3N ref.[12]  (no mention) | radio frequency magnetron sputtering | thin films | 28 mA/cm2 | 55 | ~700 |
| Fe2N@carbon textile ref.[13]  (1.7~2.0 mg, 1.0 cm2) | hydrothermal method and thermal treatment | nanoparticles composite | 1000/6000 | 100/300 | 650/240 |
| MoN/N doped CNT ref.[14]  (no mention, 1.13 cm2) | hydrothermal and calcination approach | nanocomposite | 100/1500 | 200/20 | 1232/989.5 |

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