

Ni Nanoparticle Doped porous VN Nanoflake Assembled into Hierarchical Hollow Microspheres with a Structural Inheritance from the $\text{Ni}_{1-x}\text{V}_x\text{O}_2$ cathode material for High Performance Asymmetric Supercapacitor

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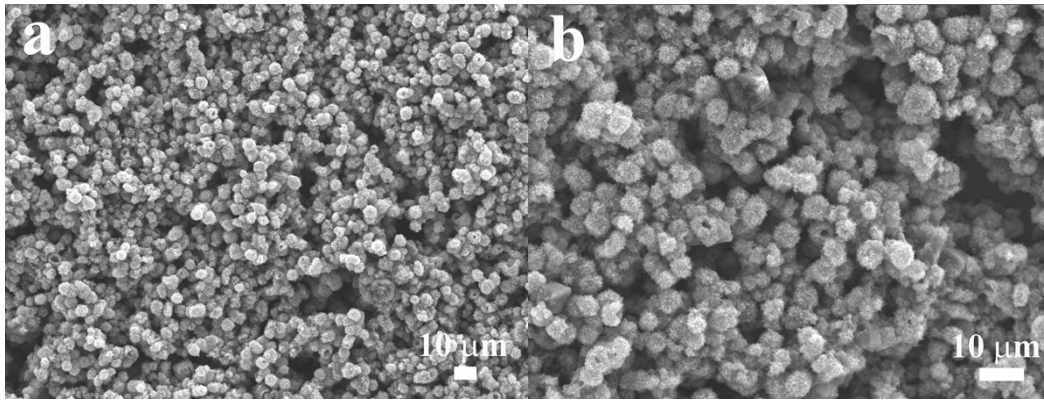


Fig.S1. Panoramic SEM images of the (a) $\text{Ni}_{1-x}\text{V}_x\text{O}_2$ HHMS and the (b) Ni/VN HHMS samples.

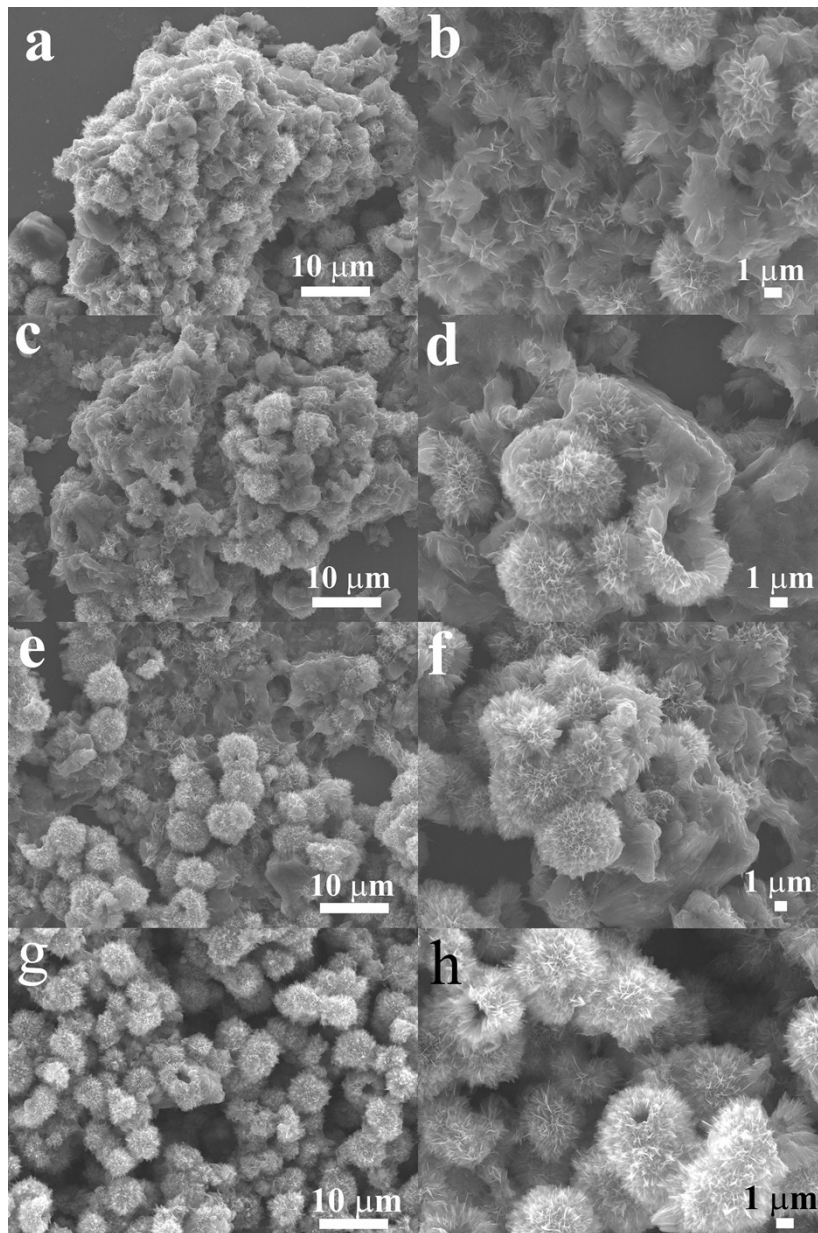


Fig.S2. Time-dependent experiments for the growth of HHMS structure. Growth at (a and b) 6 h, (c and d) 12 h, (e and f) 18 h, and (g and h) 24 h, respectively.

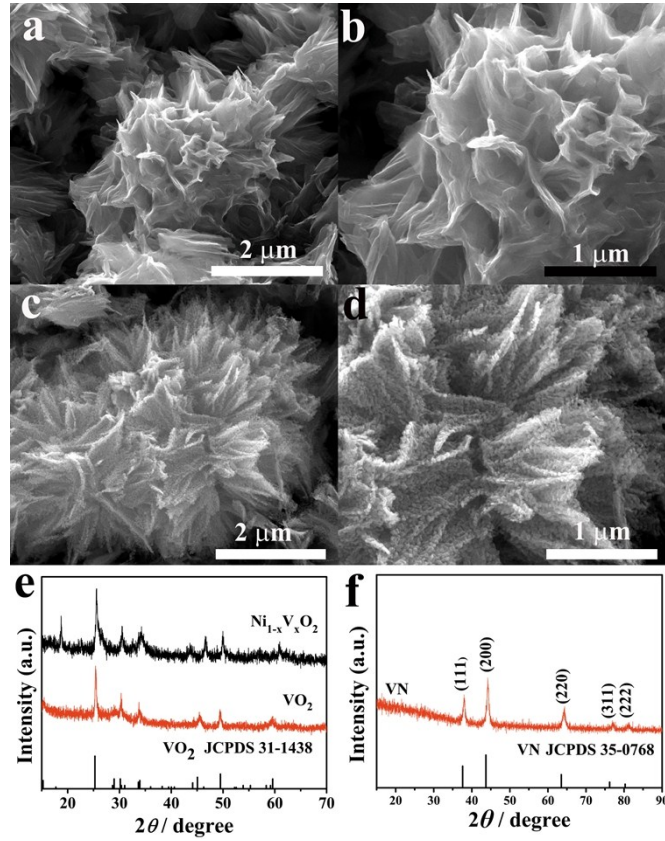


Fig.S3. (a-b) SEM images of the VO₂ sample. (c-d) SEM images of the VN sample. XRD patterns of the (e) the VO₂ and (f) the VN samples.

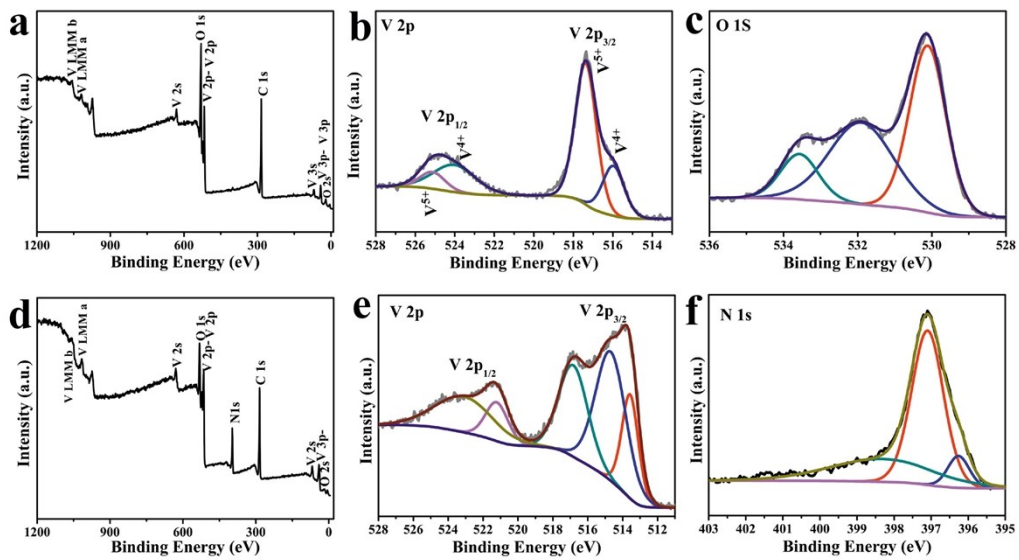


Fig.S4. XPS spectra of (a) survey scan, (b) V 2p region, and (c) O 1s region for the VO₂ sample. XPS spectra of (d) survey scan, (e) V 2p region, and (f) N 1s region for the VN sample.

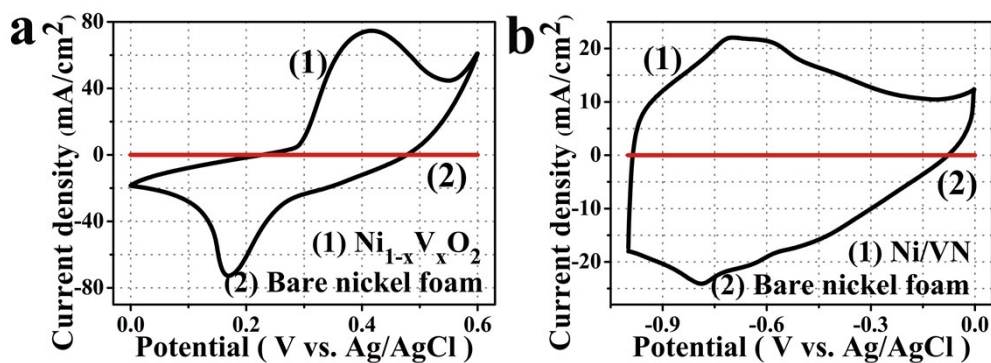


Fig.S5 (a) CV curves of bare nickel foam (the red line) and Ni_{1-x}V_xO₂ composite electrode (the black line) measured at a scan rate of 30 mV s⁻¹ in 2.0 M KOH aqueous electrolyte. (b) CV curves of bare nickel foam (the red line) and Ni/VN composite electrode (the black line) measured at a scan rate of 30 mV s⁻¹ in 2.0 M KOH aqueous electrolyte.

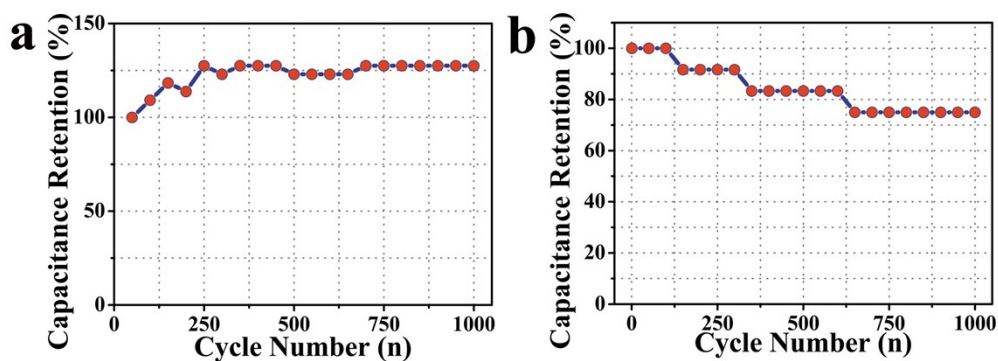


Fig.S6 Long-term cycling stability of the (a) Ni_{1-x}V_xO₂ HHMS and (b) Ni/VN HHMS electrodes at a current density of 10 mA cm⁻² in 2 M KOH electrolyte in a three-electrode system.

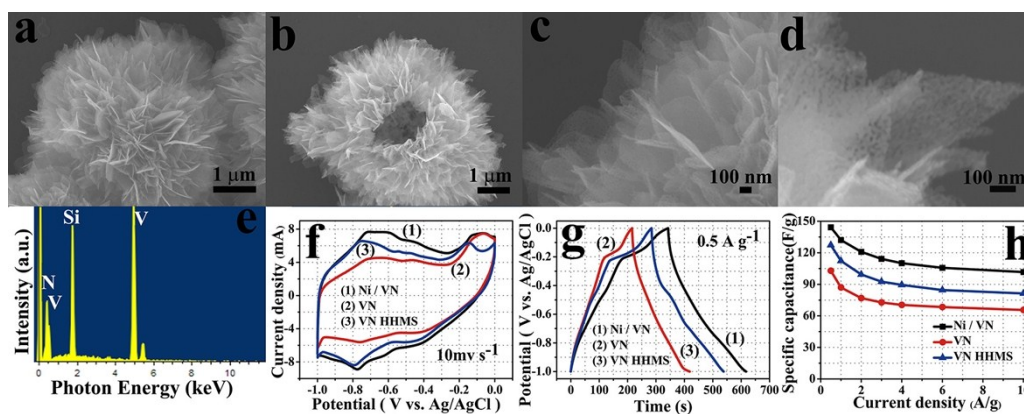


Fig.S7 (a-d) SEM images of the VN HHMS sample. (e) EDS spectrum of the VN HHMS sample. (f) CV curves of the Ni/VN, VN and VN HHMS electrodes at a scan rate of 10 mV s⁻¹. (g) GCD curves of the Ni/VN, VN and VN HHMS electrodes at a current density of 0.5 A g⁻¹. (h) Variation of specific capacitances against current densities for the Ni/VN, VN and VN HHMS electrodes.

Table SI. The Specific Capacitance Comparison of Other ASC Full Cells

| Serial no. | ASC | Electrolyte | Specific capacitance | Ref |
|------------|--|---------------------------------------|------------------------|----------|
| 1 | rGO//NiO | 1 M KOH | 50 F g ⁻¹ | 1 |
| 2 | CNFs//Ni ₃ S ₂ /CNFs | 2 M KOH | 56.6 F g ⁻¹ | 2 |
| 3 | AC//Co ₃ O ₄ NSs-rGO | 2 M KOH | 46 F g ⁻¹ | 3 |
| 4 | AC//Ni-Co oxide | 1 M KOH | 60 F g ⁻¹ | 4 |
| 5 | GHCS//GHCS-MnO ₂ | 1 M Na ₂ SO ₄ | 24.5 F g ⁻¹ | 5 |
| 6 | carbon//nickel oxide | 6 M KOH | 37 F g ⁻¹ | 6 |
| 7 | GH//MnO ₂ -NF | 0.5 M Na ₂ SO ₄ | 41.7 F g ⁻¹ | 7 |
| 8 | AC//AC-MnO ₂ | 0.5 M Na ₂ SO ₄ | 23.1 F g ⁻¹ | 8 |
| 9 | Ni/VN // Ni _{1-x} V _x O ₂ | 2 M KOH | 65.7 F g ⁻¹ | our work |

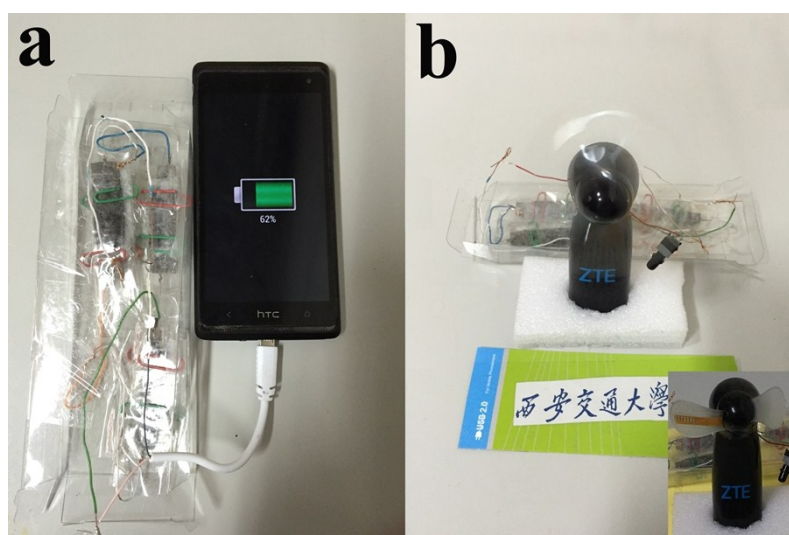


Fig.S8 (a) Photograph showing a mobile phone charged by three ASCs in series. (b) Picture showing that three prepared device can drive a rotating motor.

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