

Nanoporous NiF₂ for energy storage

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Device fabrication process

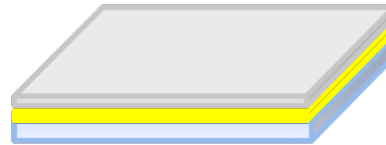
(i) plasma treatment



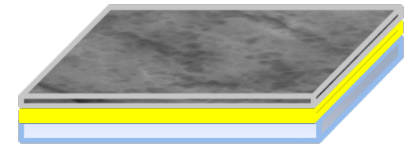
(ii) sputter Cr/Au



(iii) electrodeposit metal layer



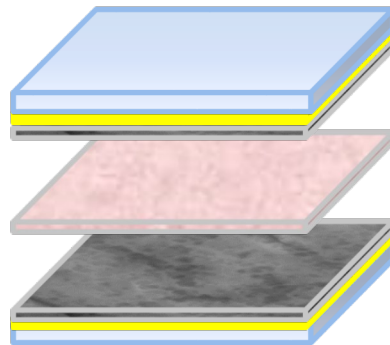
(iv) anodization to form porous layer



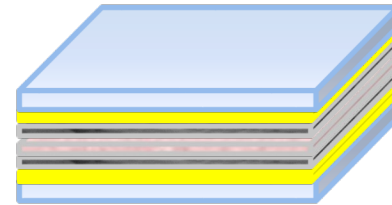
(v) preparation of solid electrolyte

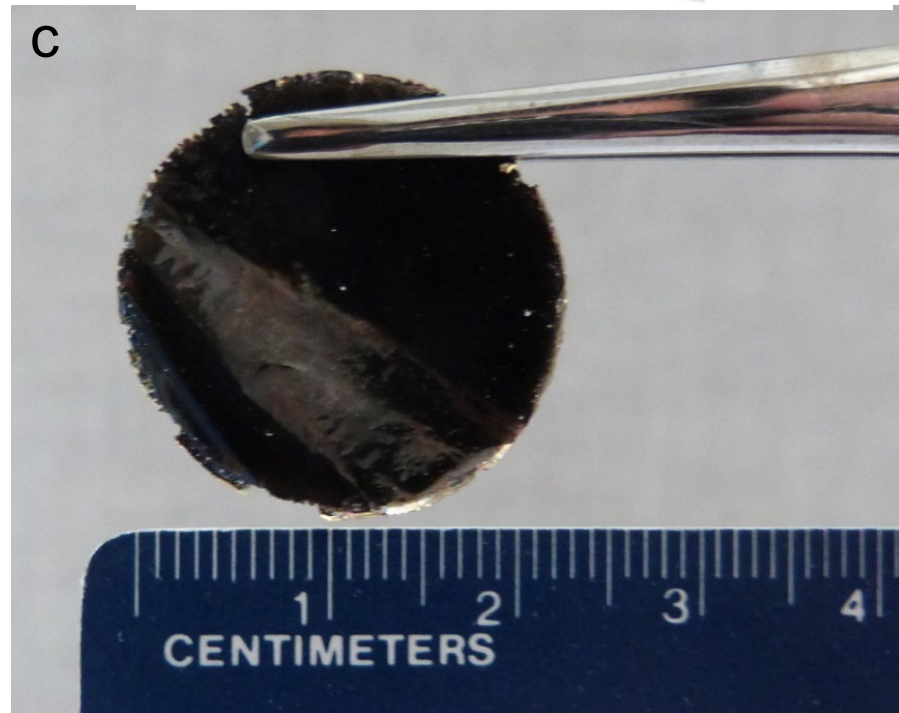
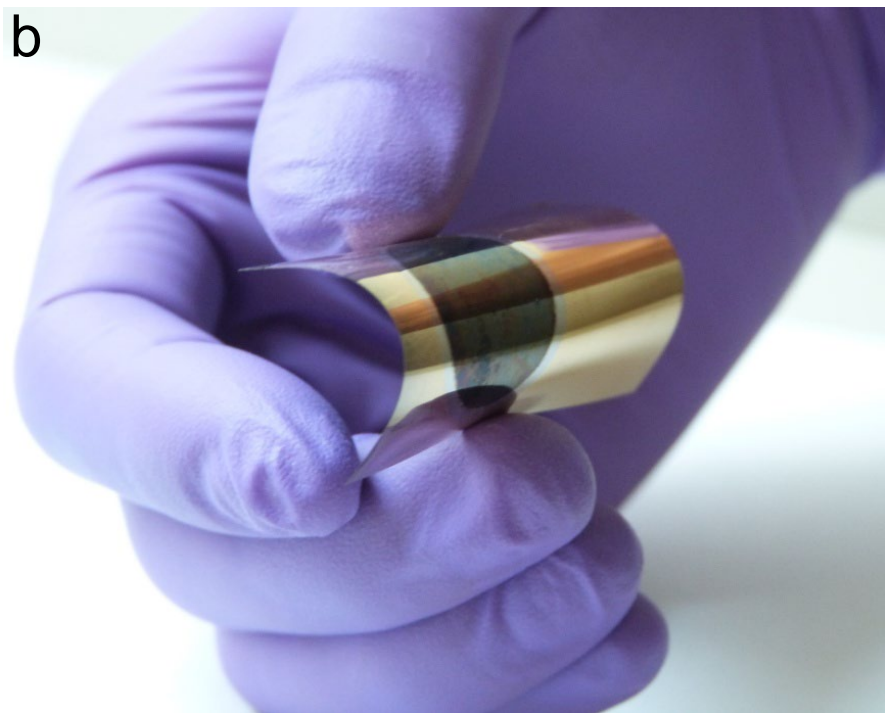
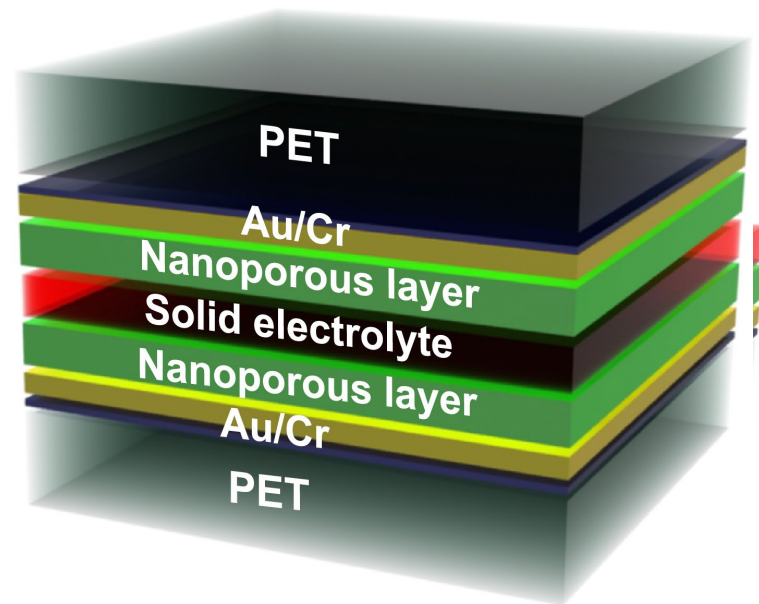
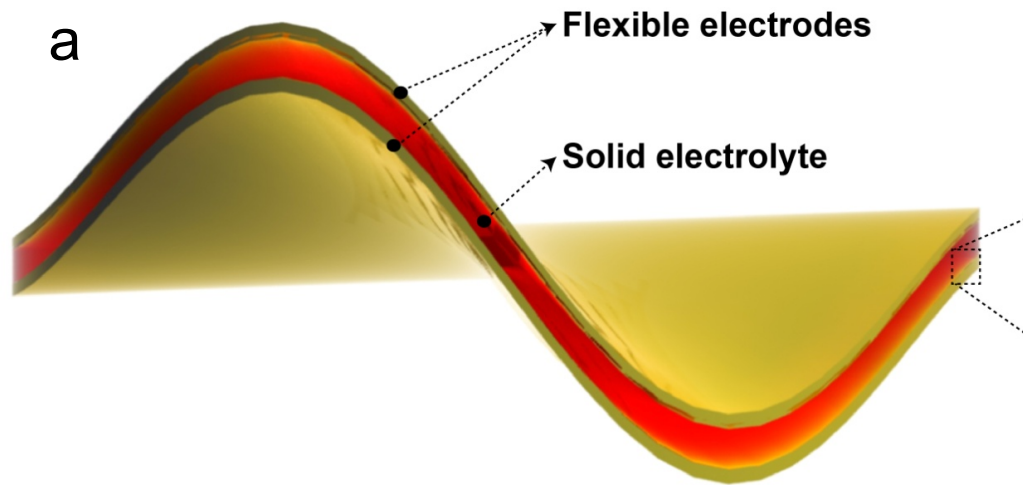


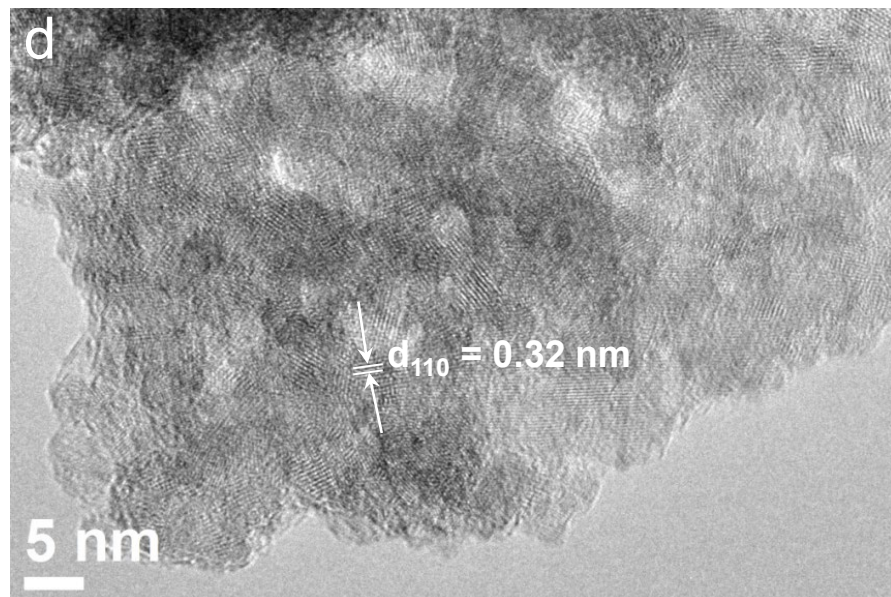
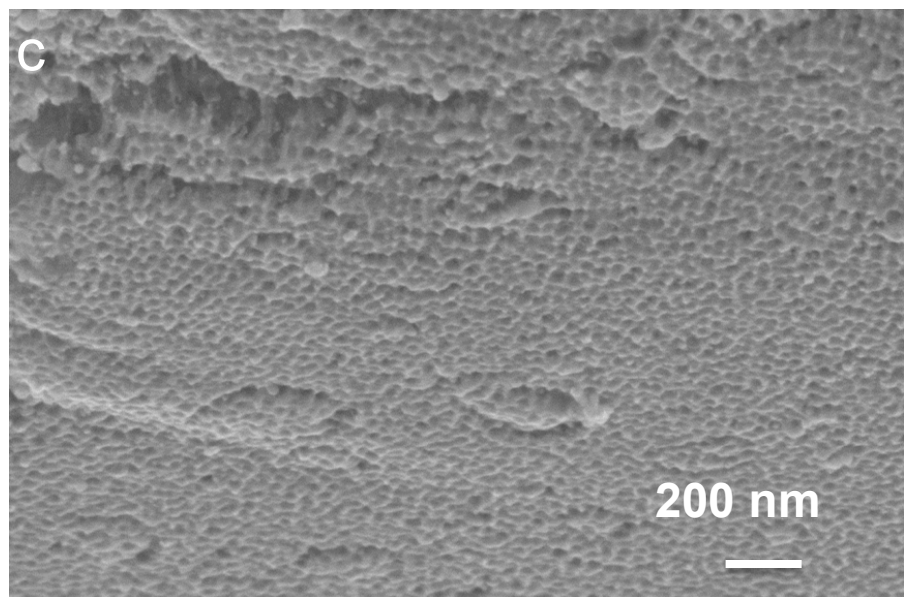
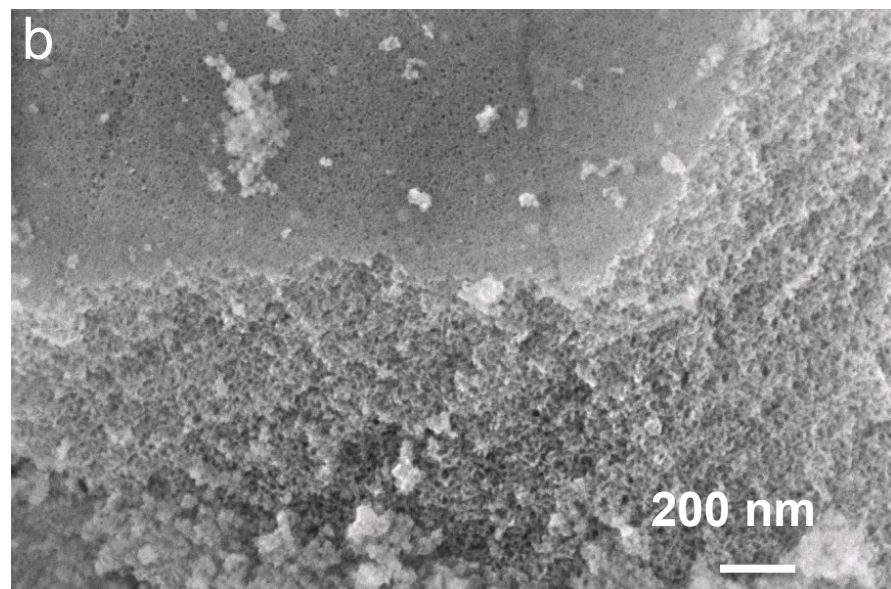
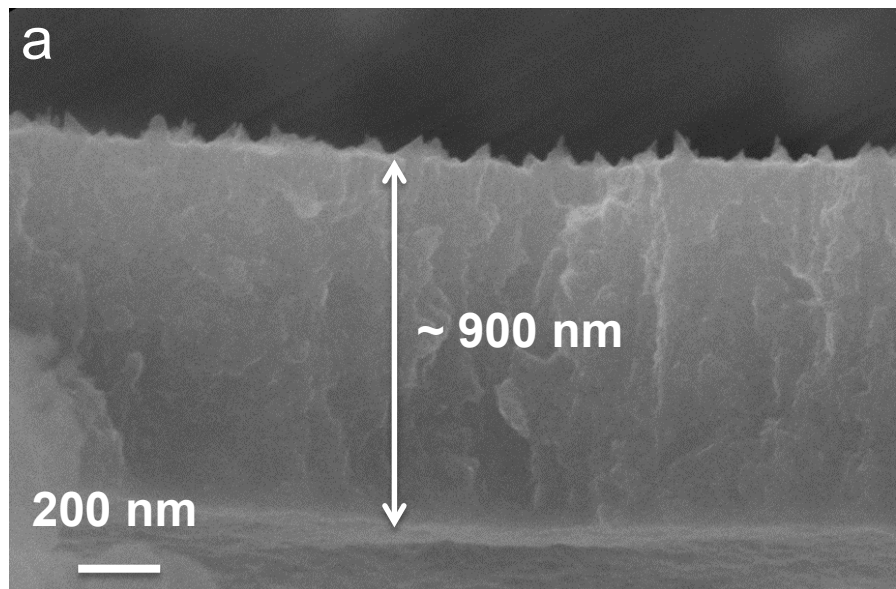
(vi) supercapacitor device assembly

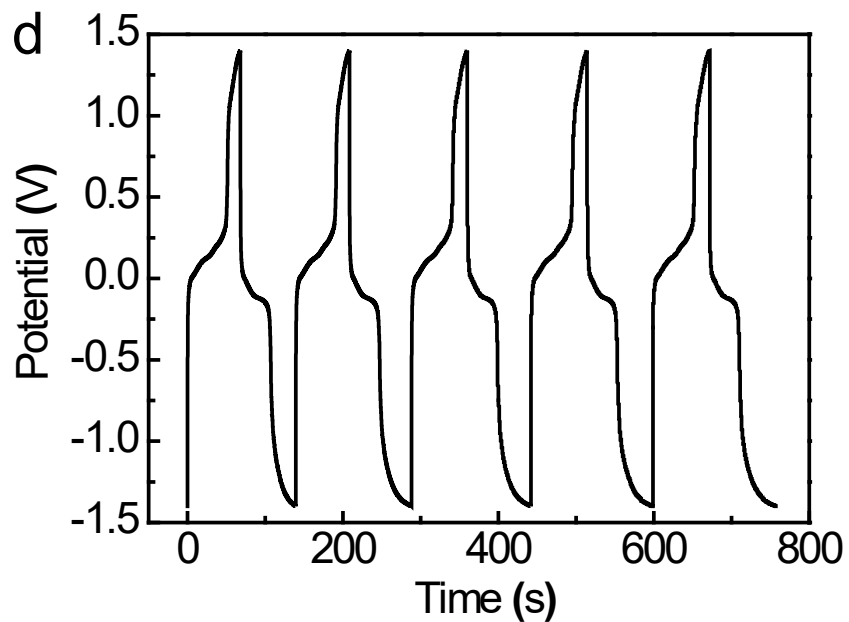
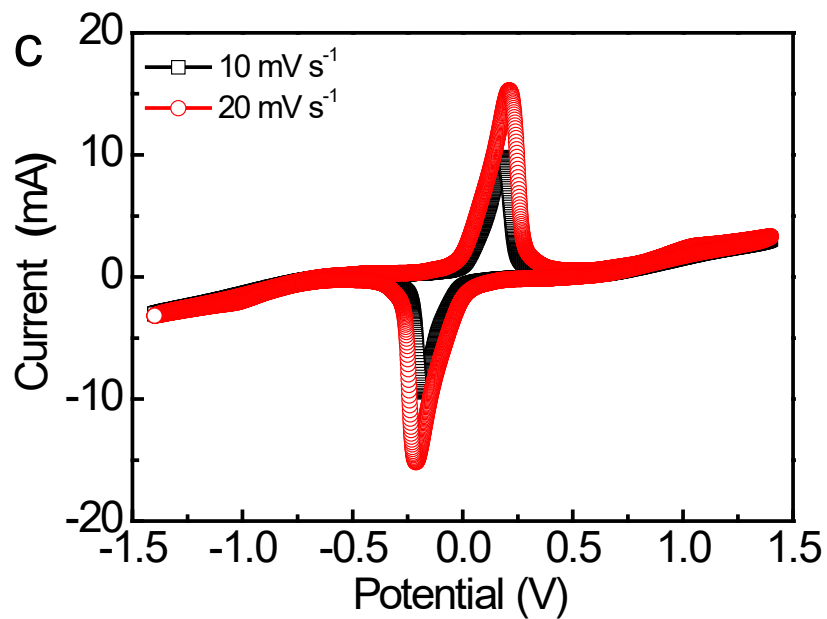
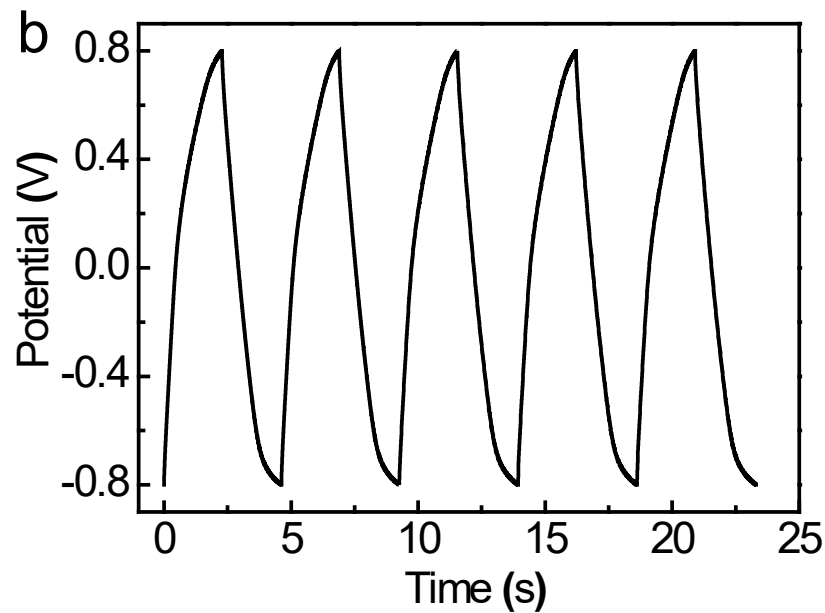
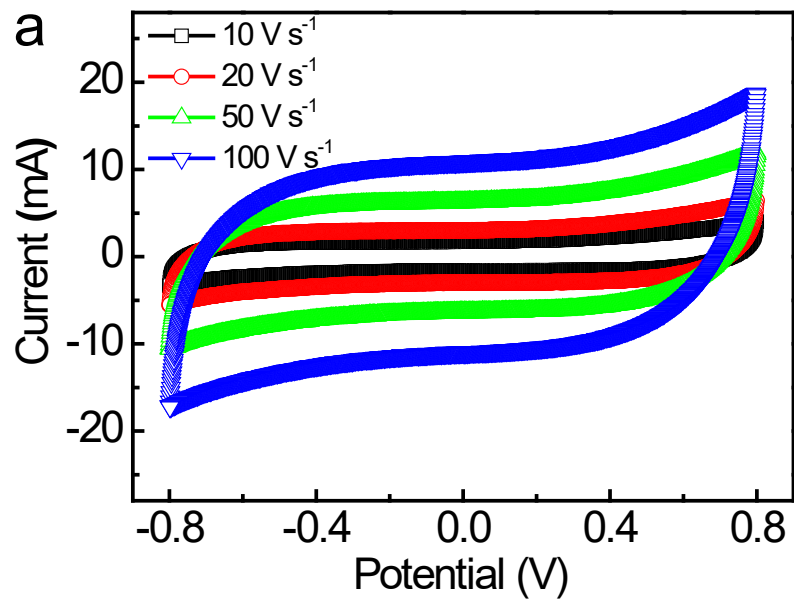


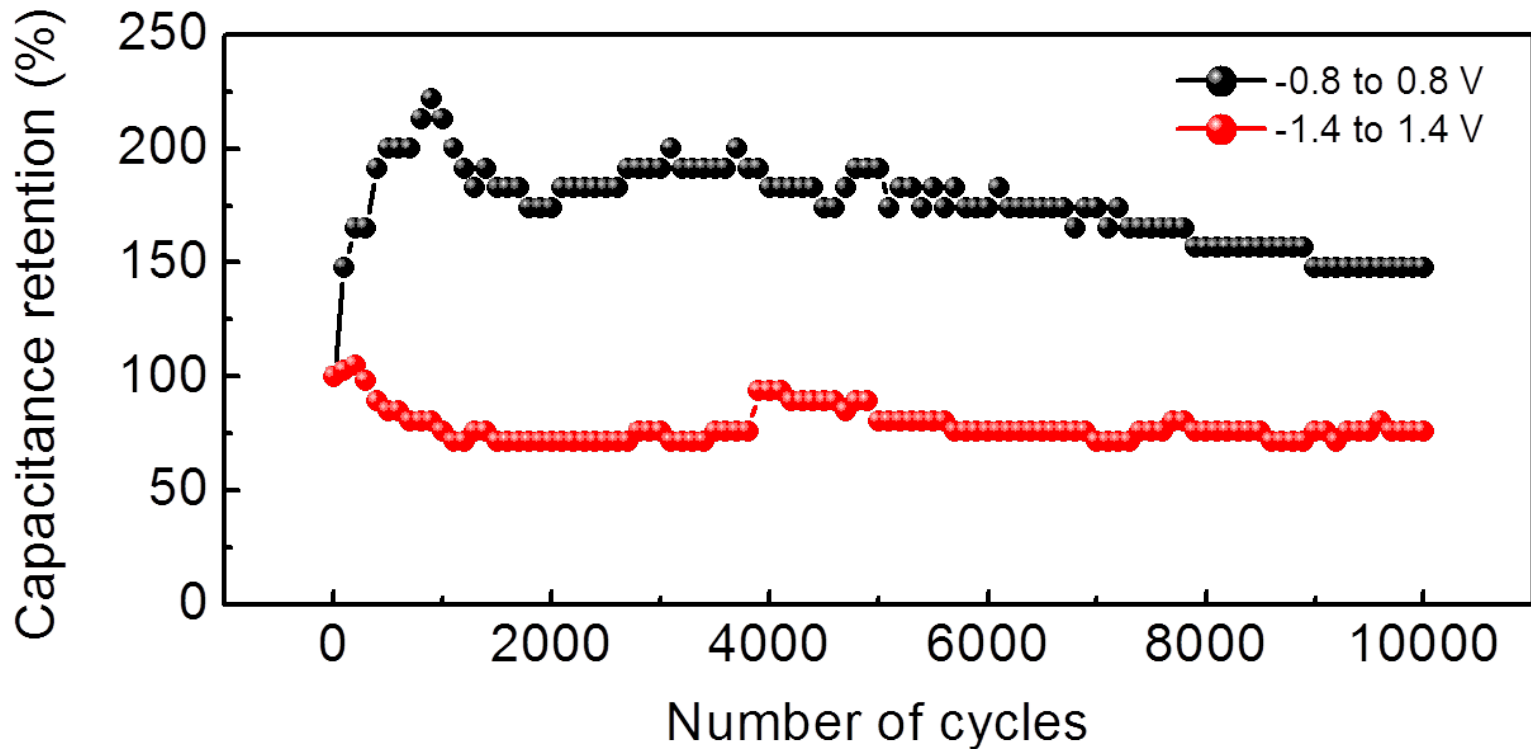
(vii) ready for testing



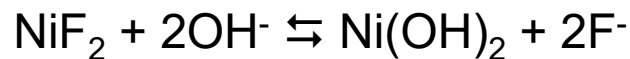








Proposed charge storage mechanism :



Double layer capacitor: 0.29 mF cm^{-2} (3.2 F cm^{-3} or 1.57 F g^{-1}),
 energy density of 0.6 Wh kg^{-1} and power density of 8 kW kg^{-1}

Pseudocapacitor: 66 mF cm^{-2} (733 F cm^{-3} or 358 F g^{-1}), energy
 density of 384 Wh kg^{-1} and power density of 112 kW kg^{-1}

Advantages of nanoporous NiF₂

1. Wide operation potential window – high energy density
2. Long term stability – reliable performance
3. Li-free, battery-like supercapacitors – works easily
4. Can be used for Ni-Cd and Ni-MH batteries
5. Easy fabrication – only needs a power source
6. Can be grown on any substrates, any shapes, any sizes