Ultralong Cycle Life of Solid Flexible Asymmetric Supercapacitors Based on Nickel Vanadium Sulfide Nanospheres

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1 Experimental Section

All reagents used in the experiment were of analytical grade and used without further purification.

1.1 Preparation of reduced graphene oxide(rGO)

Graphene oxide (GO) was obtained via modified Hummers method [1]. Cysteine was used to reduce graphene oxide via a simple hydrothermal method. 6 mg cysteine was dissolved in 30 mL graphene oxide solution (2 mg/mL). Then the mixture were transferred into 50 mL Teflon-lined stainless autoclave and heated to 160℃ for 4 h in an oven. The obtained product was washed with ethanol and deionized water several times and freeze-drying for further use. The as-prepared product was marked reduced graphene oxide (rGO).

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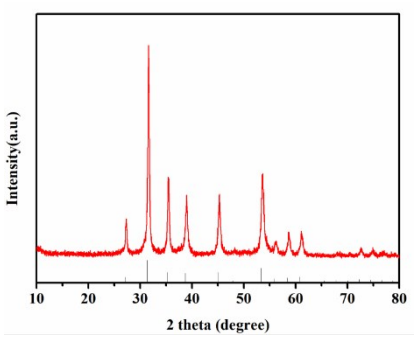

Fig. S1 XRD patterns of products obtained in presence of $Ni(NO_3)_2$•$6H_2O$ at 160 °C with 2.0g TEOA

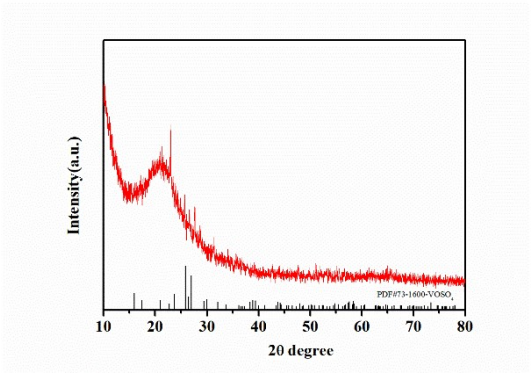

Fig. S2 XRD patterns of products obtained in presence of Na_3VO_4 at 160 °C with 2.0g TEOA

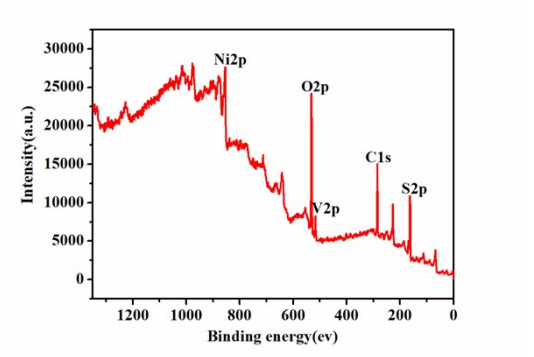

Figure S3. XPS survey spectrum of the Ni-V-S nanospheres

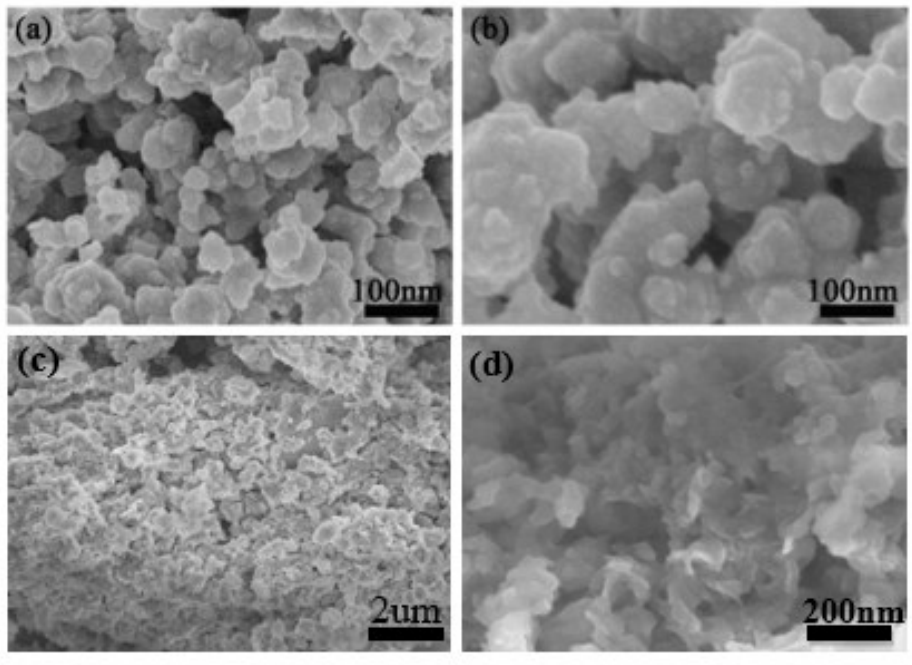

Fig. S4 (a, b) The SEM patterns of NiS_2, (c, d) The SEM patterns of $VOSO_4$

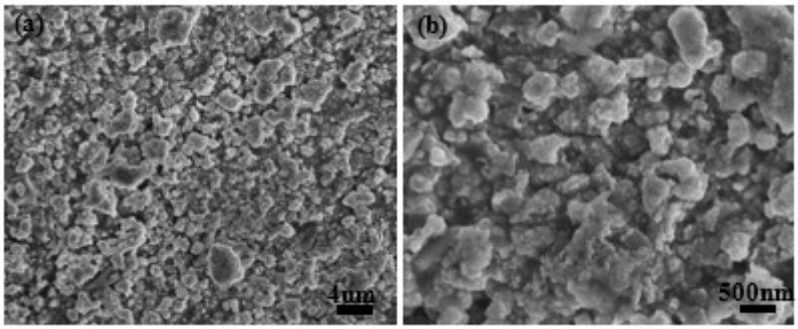

Fig. S5 SEM images without TEOA

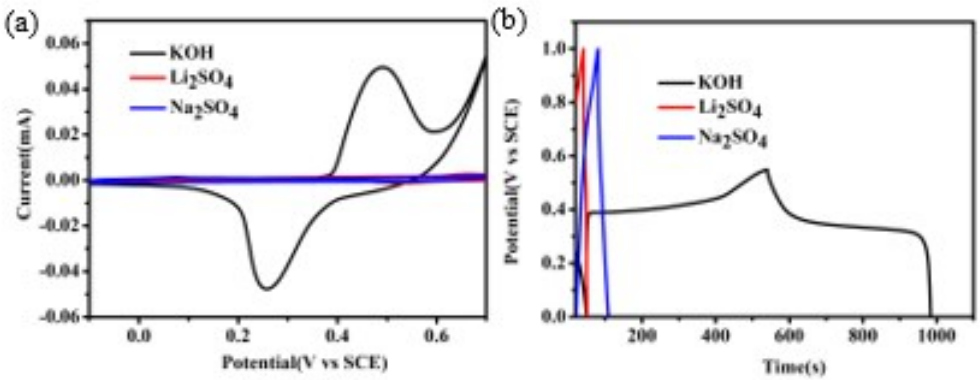

Fig. S6 (a) CV curves in Li_2SO_4, Na_2SO_4 and KOH electrolyte solution，(b) GCD curves in Li_2SO_4, Na_2SO_4 and KOH electrolyte solution.

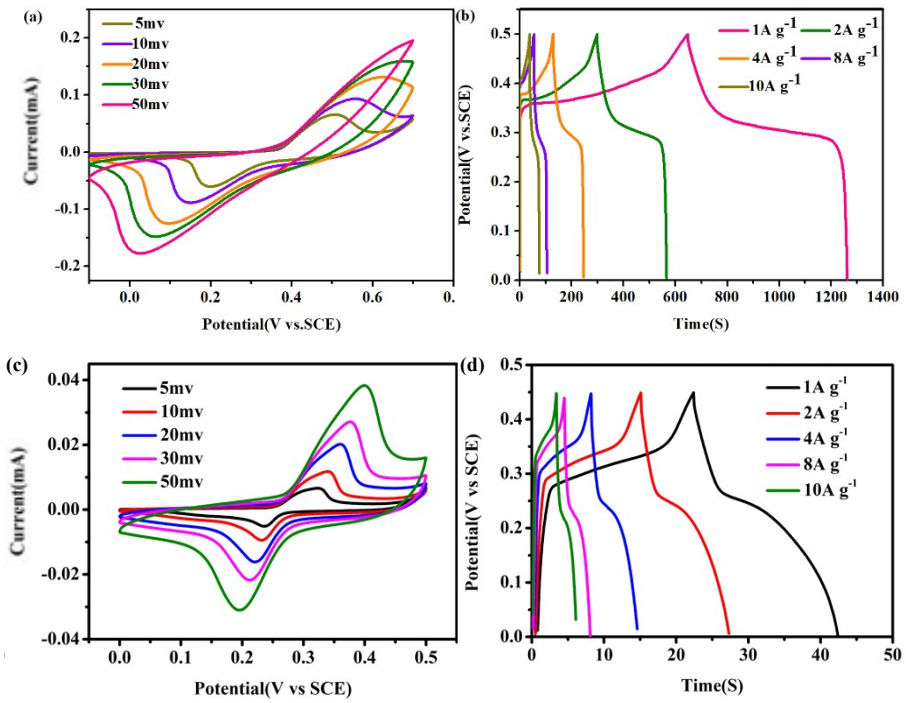

Fig. S7 (a, b) CV curves at various scan rates, and (c,d) GCD curves at various current densities for NiS_2 and $VOSO_4$, respectively

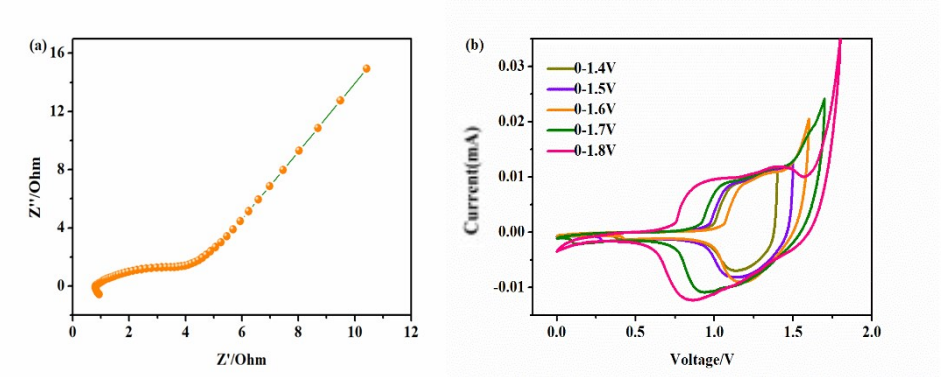

Fig. S8 (a) EIS curves of the samples at the 2.0g TEOA(b) CV curves at a scan rate of 5mV s^{-1} in different voltage windows.

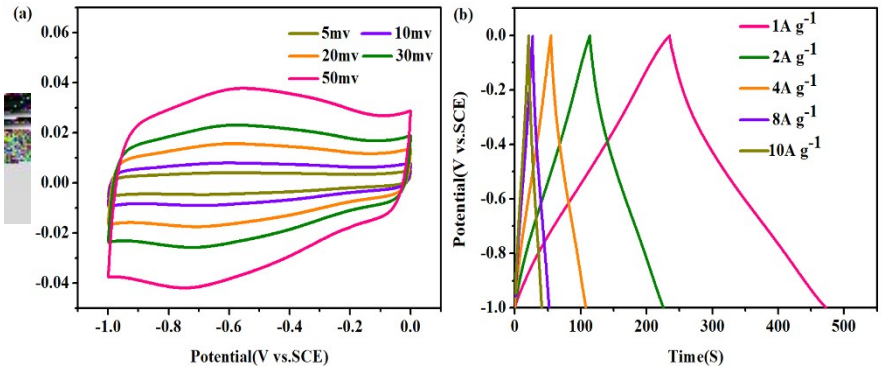

Fig.S9 (a) CV curve of rGO. (b) GCD curve of rGO

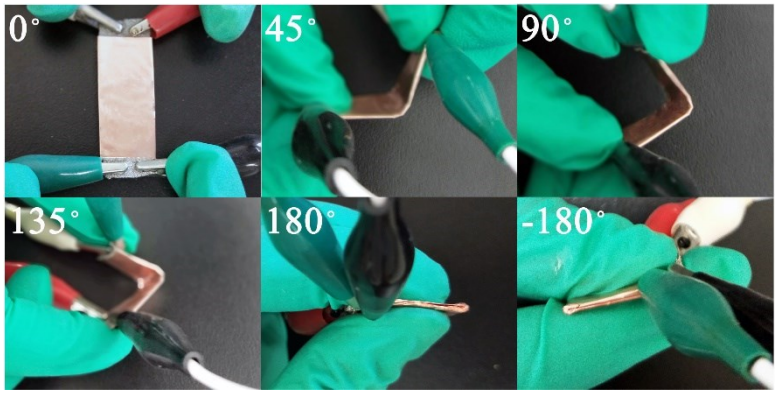

Fig.S10 Digital photos of ASC with solid state electrolyte under different bending angles (0°, 45°, 90°, 135°, 180°, and -180°).

Reference

[1] W.S.H. Jr, R.E. Offeman, Preparation of Graphitic Oxide, Journal of the American Chemical Society 1958 **80** 1339.