

Supplementary information

Electrochemical kinetics of cerium selenide nano-pebbles: Design of device grade symmetric configured wide-potential flexible solid-state supercapacitor

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S1. Adhesion test

The adherence of the film was checked by using tixo-tape peel-off method. Initially, tixo-tape was stick on upper surface of film and then it was peel-off. The adherence of the film to the stainless steel (SS) substrate was so good that there was very minute change compare to original due to peel-off of some un-adhesive powdery particles from top-surface only. Photos show before and after peel-off image of the film on the SS substrate with no apparent change, exhibiting good adhesion.

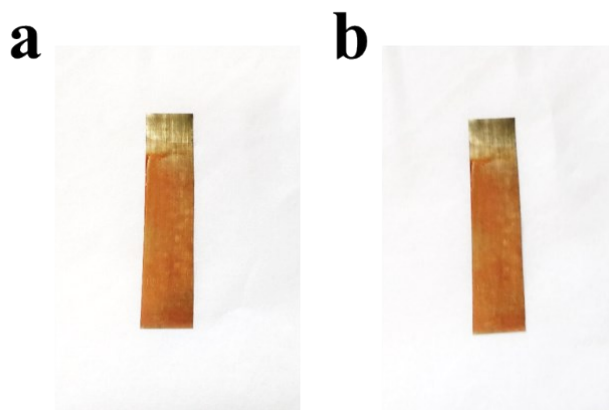


Figure S1 Electrode (a) before and (b) after peel-off test for adhesion.

S2. Contact angle analysis

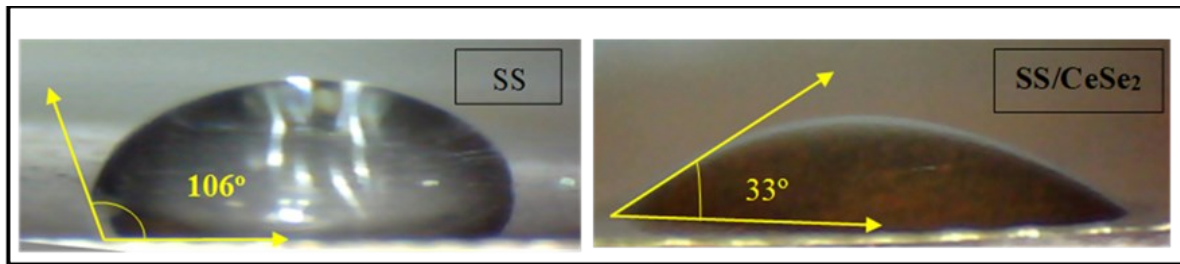


Figure S2: Contact angle for bare stainless steel (SS) substrate and SS/CeSe₂ film.

S3. Electrochemical characterizations

Specific capacitance¹ from the CV curves was calculated with the help of following formula:

$$C_s = \frac{1}{2mv\Delta V} \int_{V_i}^{V_f} I(V)dV \quad (1)$$

where, ' C_s ' signifies the specific capacitance (F/g), ' m ' indicates mass (g) deposited on SS substrate, ' v ' specifies scan rate (V), ' ΔV ' is an functional potential frame and ' $\int_{V_i}^{V_f} I(V)dV$ ', represents area under the CV curve.

Specific capacitance (C_s), specific energy (E) in Wh/kg and specific power (P) in W/kg from Galvanostatic charge-discharge can be calculated using following equations:

$$C_s = \frac{I\Delta t}{m\Delta V} \quad (2)$$

$$E = \frac{1}{2} \left[\frac{C_s \Delta V^2}{3.6} \right] \quad (3)$$

$$P = \frac{3600 \times E}{\Delta t} \quad (4)$$

where, ' I ' represents current intensity and ' Δt ' denotes discharge time (t) of the experimental charge-discharge curve.

Table S1 Equivalent circuit parameters obtained from calculated EIS spectra for the electrode.

Material	R (Ω)	CPE		R (Ω)	W (Ω)	CPE		R (Ω)	Chi square
		Y_0 (F)	n			Y_0 (F)	n		
Cerium selenide	3.1	2.95×10^{-4}	0.86	9.24	3.91	17.15×10^{-4}	0.59	47.54	9.71×10^{-4}

References

1. S. Vijayakumar, S.-H. Lee and K.-S. Ryu, *Electrochim. Acta*, 2015, **182**, 979-986.