

SUPPORTING INFORMATION

Hierarchically mesostructured aluminum current collector for enhancing the performance of supercapacitors

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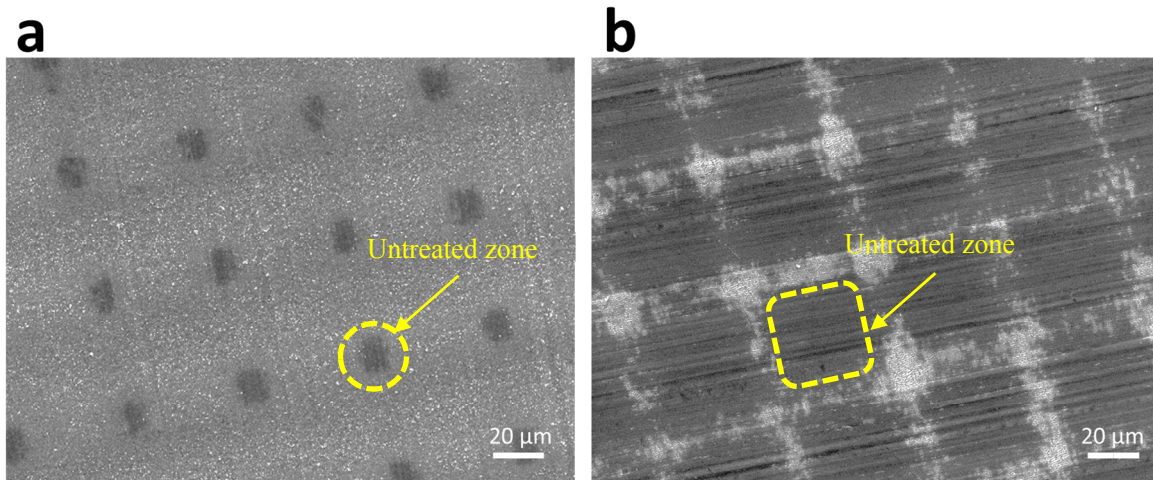


Figure S1. SEM images of picosecond laser-treated Al foils with different processing parameters. (a) With a high energy density (i.e., the fluence of 0.71 J cm^{-2}), the Al foil became wrinkled due to the heat accumulation and the untreated zones were relatively small. (b) With a low energy density (i.e., the fluence of 0.08 J cm^{-2}), the Al foil exhibited discontinuous and shallow scanned tracks in the surface, which only brought about a limited enhancement in electrochemical performance.

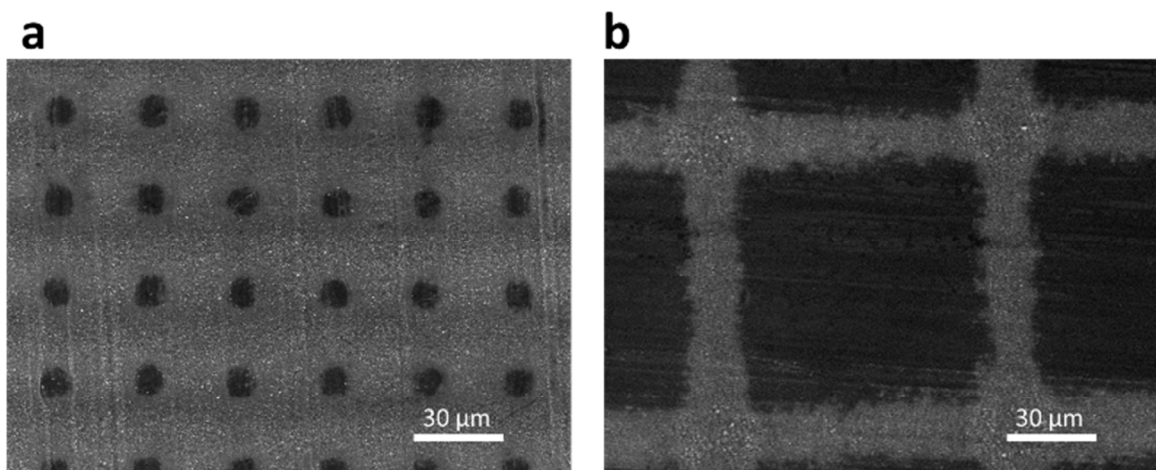


Figure S2. SEM images of the laser-treated samples with different scanning spaces, which were named as Laser-Al-30 (a) and Laser-Al-100 (b), respectively.

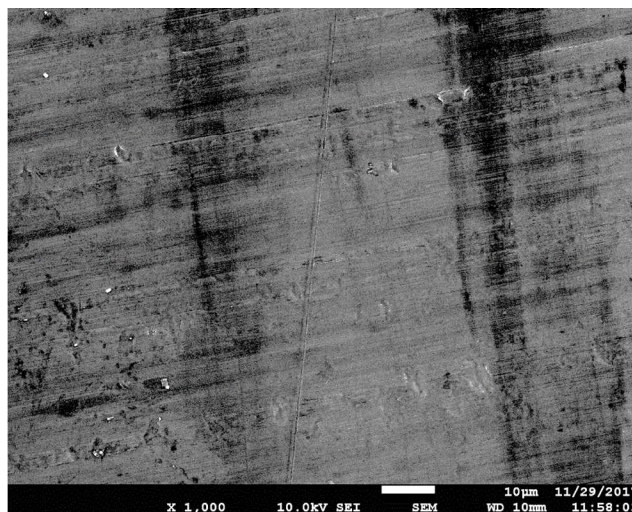


Figure S3. SEM image of Pristine-Al.

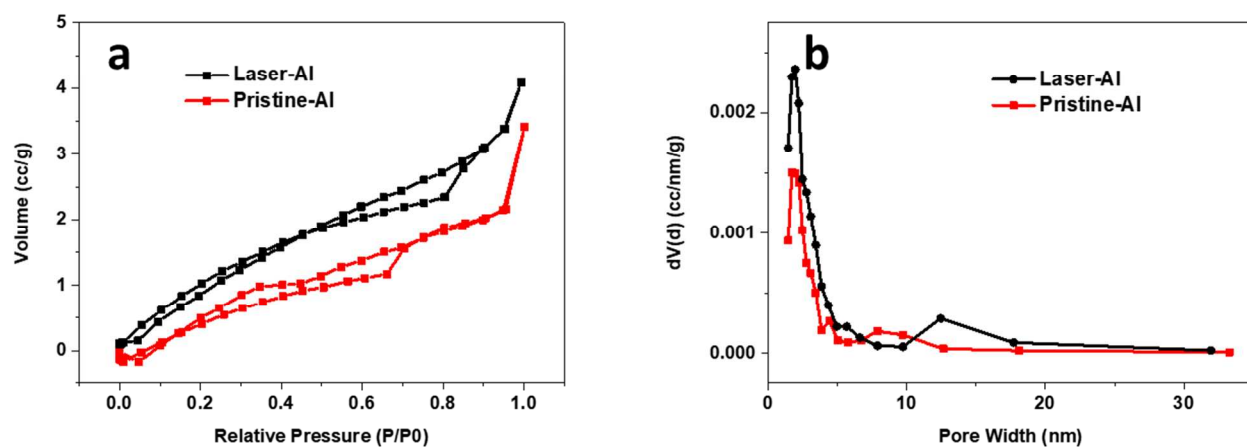


Figure S4. (a) N_2 adsorption/desorption isotherms and (b) pore size distributions of Laser-Al and Pristine-Al.

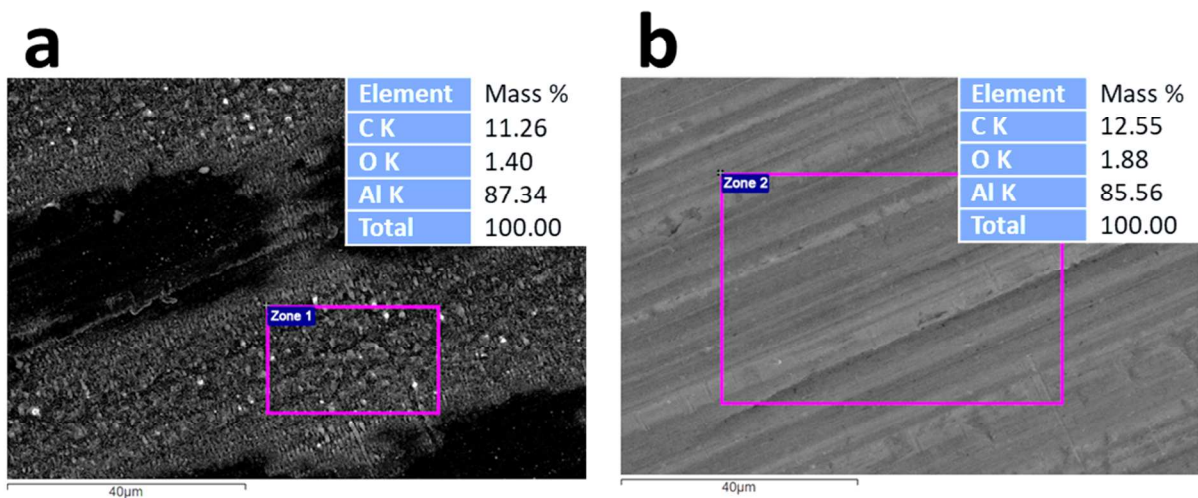


Figure S5. EDX results of the Laser-Al (a) and Pristine-Al (b). It can be seen that the content of O has a slight decline after the laser treatment. Although these data might be different from those of XPS tests, they demonstrated the similar trend of the O content reduction.

Table S1. The Al:O ratio after different laser treatment.

	Fluence of laser treatment (J cm^{-2})				
Samples	0	0.08	0.13	0.15	0.19
	(Pristine-Al)			(Laser-Al in the manuscript)	
Al:O*	0.7745	0.7777	0.7817	0.8052	0.7759

* The data was determined by XPS.

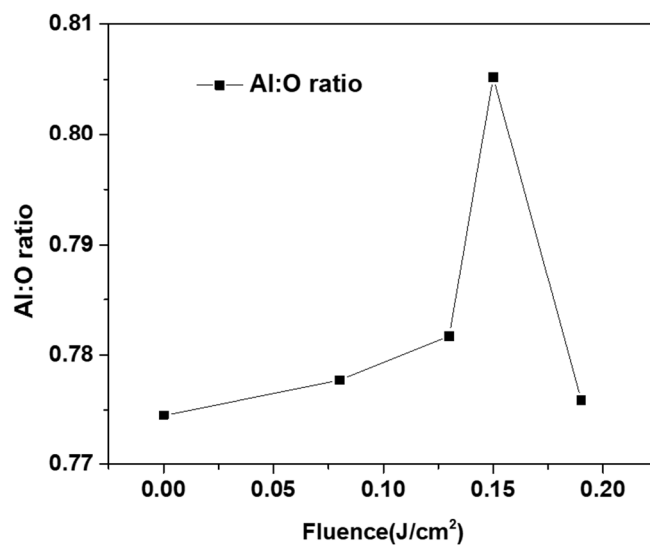


Figure S6. The Al:O ratio vs. the laser fluence.

Table S2. Detailed data of the sheet resistivity.

Samples	Sheet resistivity ($\Omega \text{ m}^{-1}$)	Average value ($\Omega \text{ m}^{-1}$)
Pristine-Al	1	0.657
	2	0.829
	3	0.560
Laser-Al	1	0.376
	2	0.257
	3	0.341

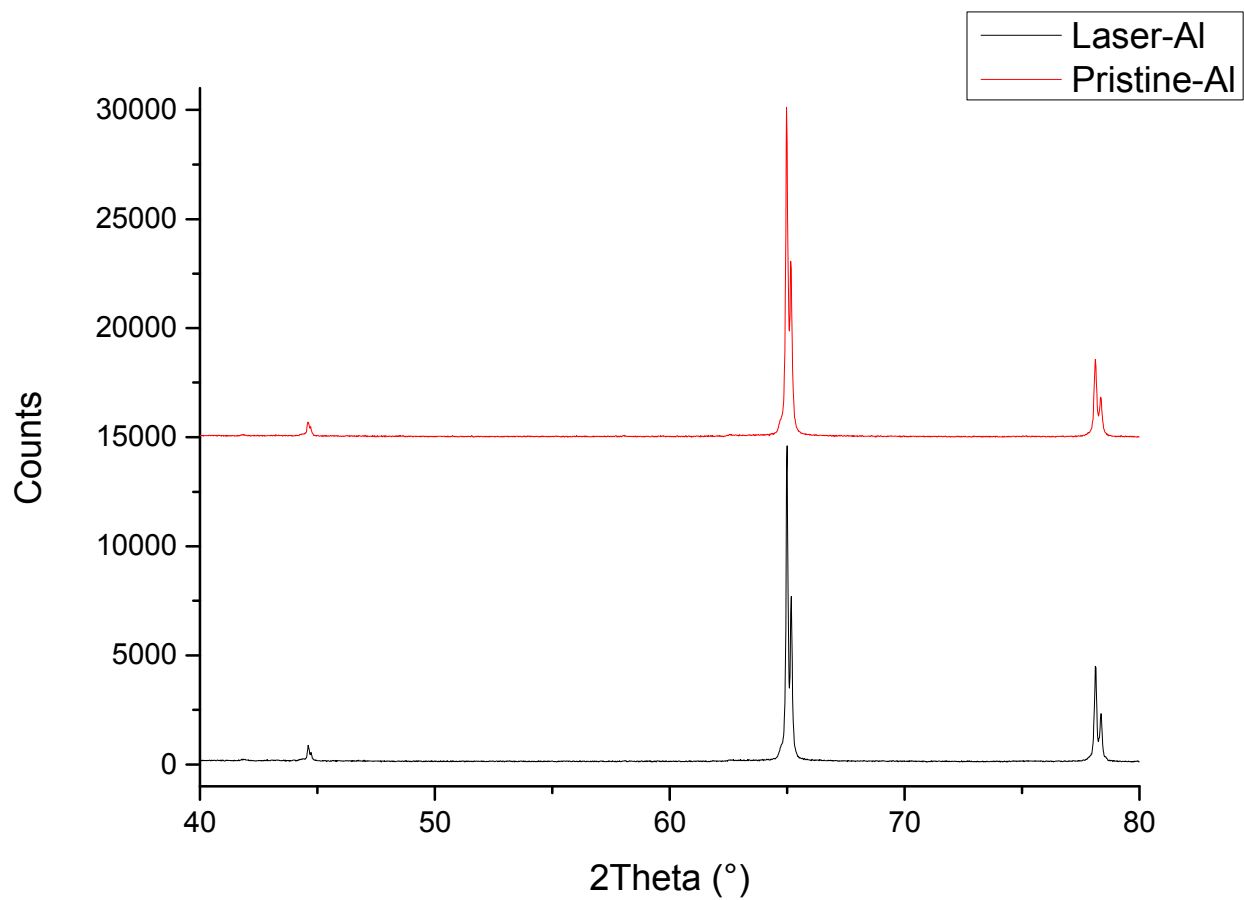


Figure S7. XRD patterns of Laser-Al and Pristine-Al.

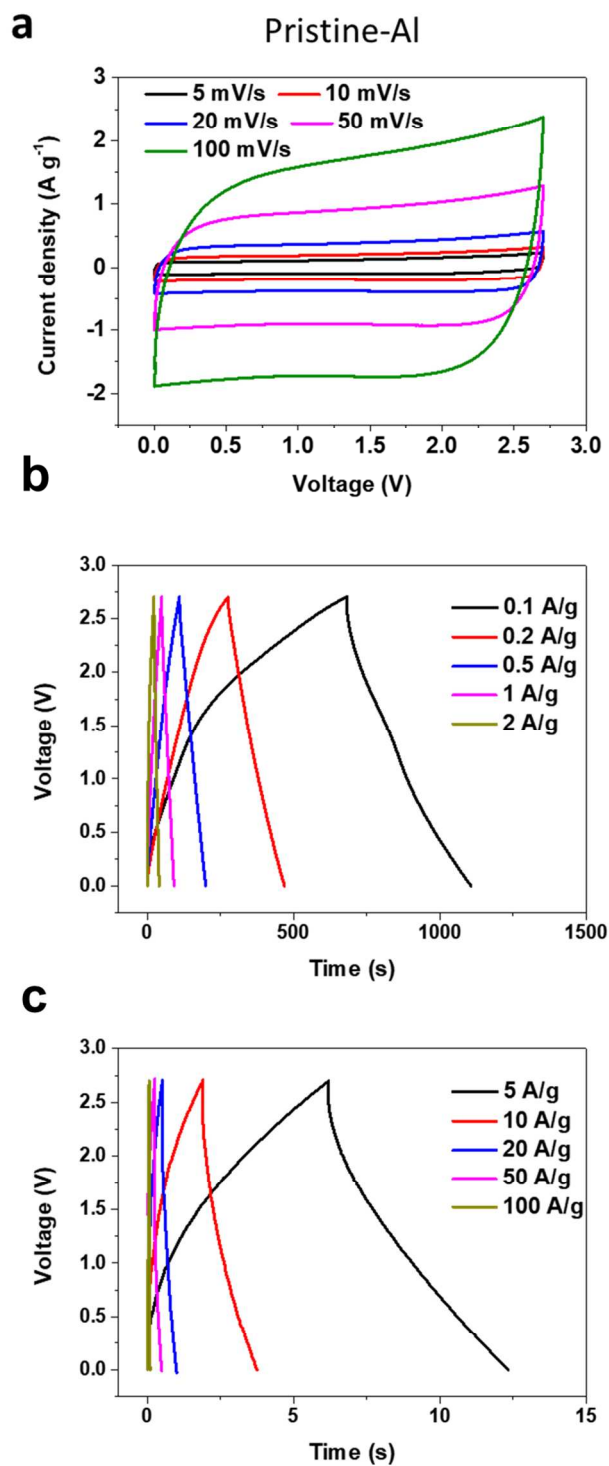


Figure S8. (a) CV curves for the coin supercapacitors with Pristine-Al as current collectors at different scan rates from 5 to 100 mV s^{-1} . (b, c) GCD curves for Pristine-Al samples obtained at different current densities from 0.1 to 100 A g^{-1} .

Table S3. Detailed mechanical testing data.

Samples		Fractured force (N)	Average value (N)
Pristine-Al	1	13.68	14.86
	2	16.19	
	3	14.72	
Aged Pristine-Al	1	8.54	9.13
	2	10.49	
	3	8.37	
Laser-Al	1	17.53	16.66
	2	15.31	
	3	16.59	
	4	17.22	
Aged Laser-Al	1	17.68	15.69
	2	15.19	
	3	14.21	

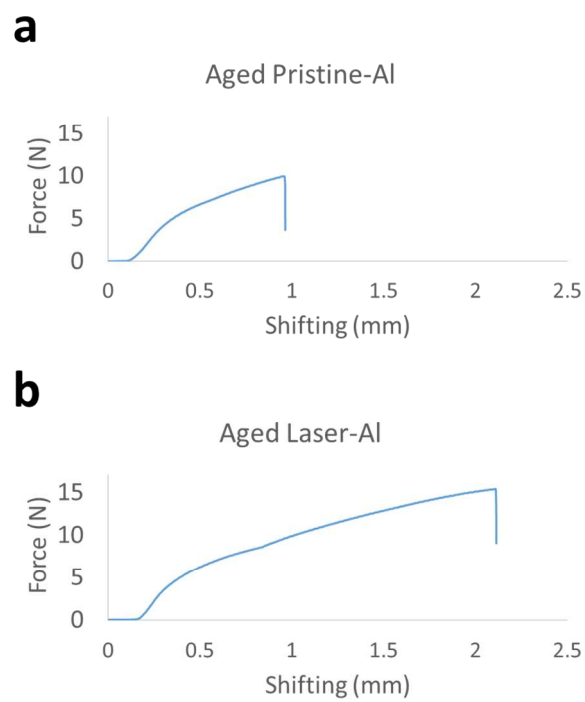


Figure S9. The typical load-displacement curves of aged Pristine-Al (a) and aged Laser-Al (b).