

Supplementary File

## **Byproduct-Compatible Upcycling of Plastic Pyrolysis Wax into Activated Carbon for Supercapacitor Electrodes**

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Figure S1. Optical images and TGA curves of PEWax\_SY samples stabilized by sulfonation at 130 and 150 °C

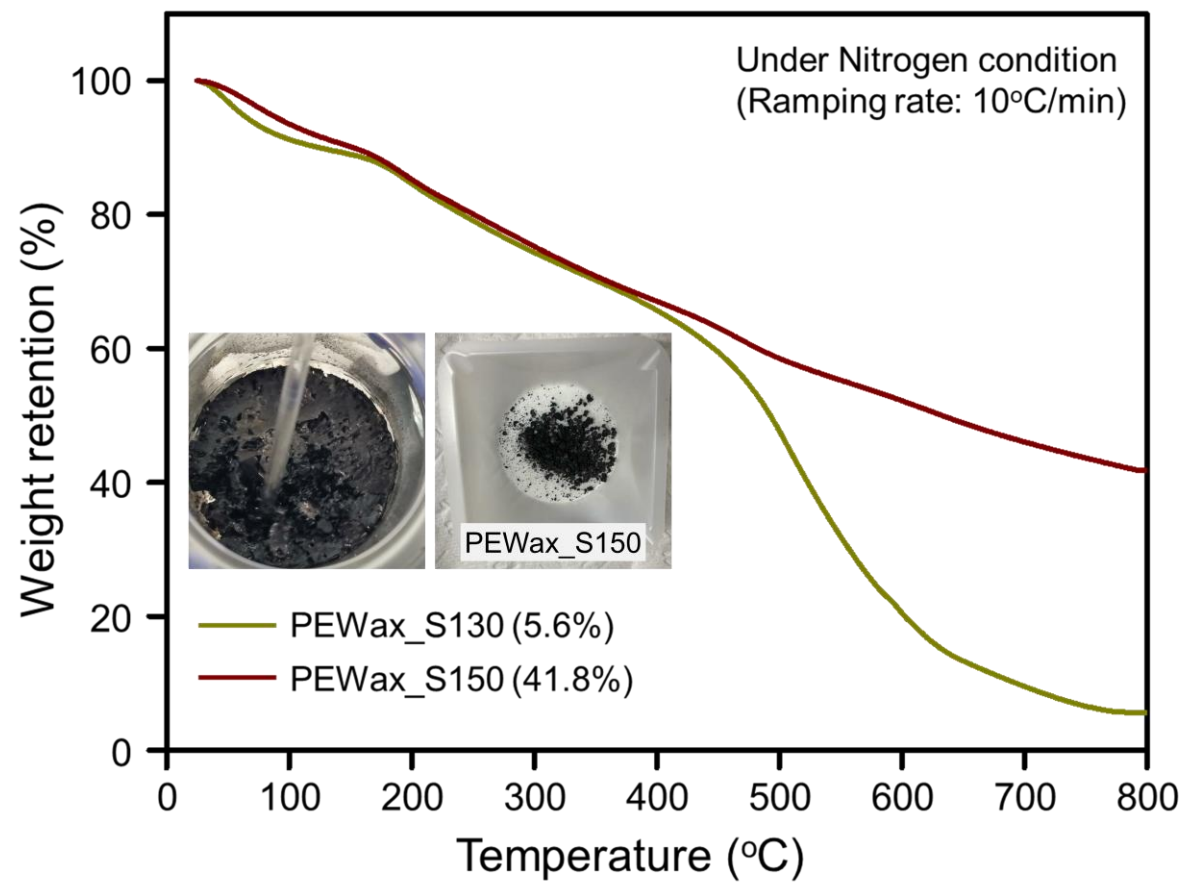


Figure S2. Thermogravimetric behavior of thermally oxidized commercial LLDPE (PE\_TX) for comparison with PE pyrolysis wax

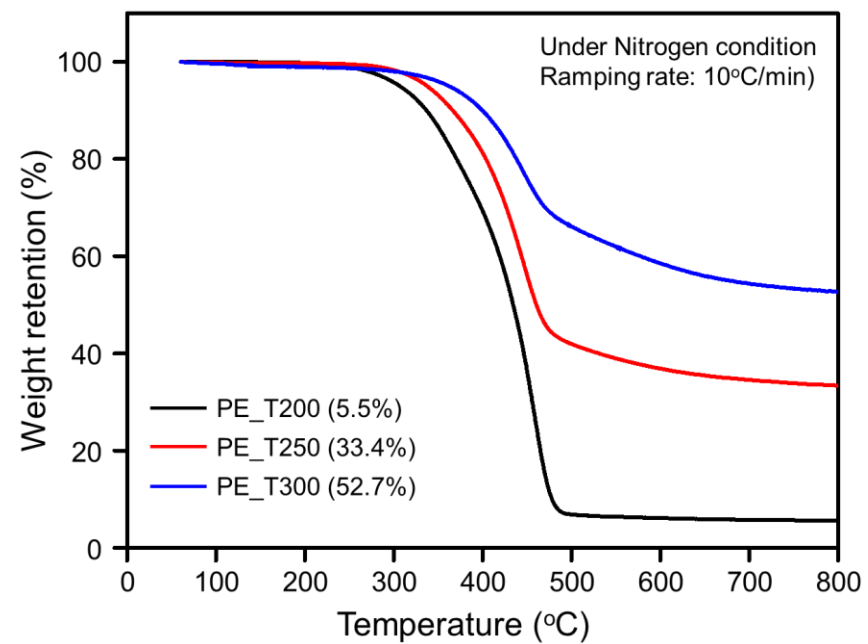
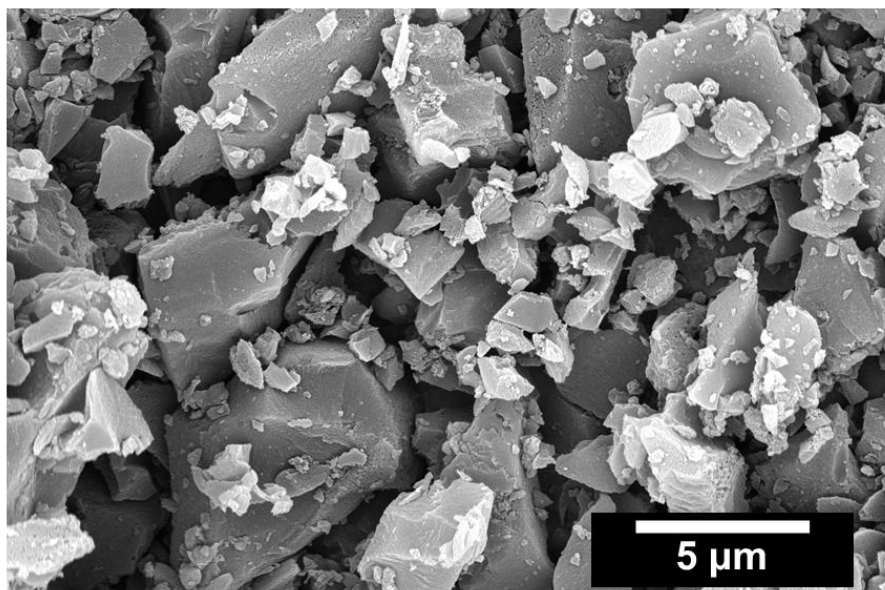


Figure S3. SEM image of PEWax\_AC obtained at an appropriate magnification (5k) to illustrate the surface morphology of the activated carbon

Commercial AC



PEWax\_AC

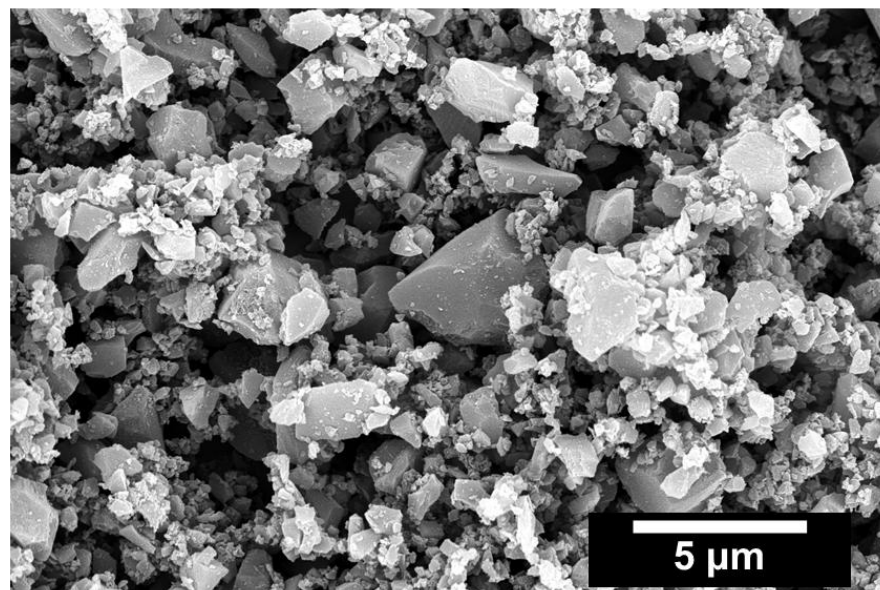


Figure S4. BJH pore size distribution of PEWax\_AC and commercial activated carbon derived from nitrogen adsorption–desorption measurements

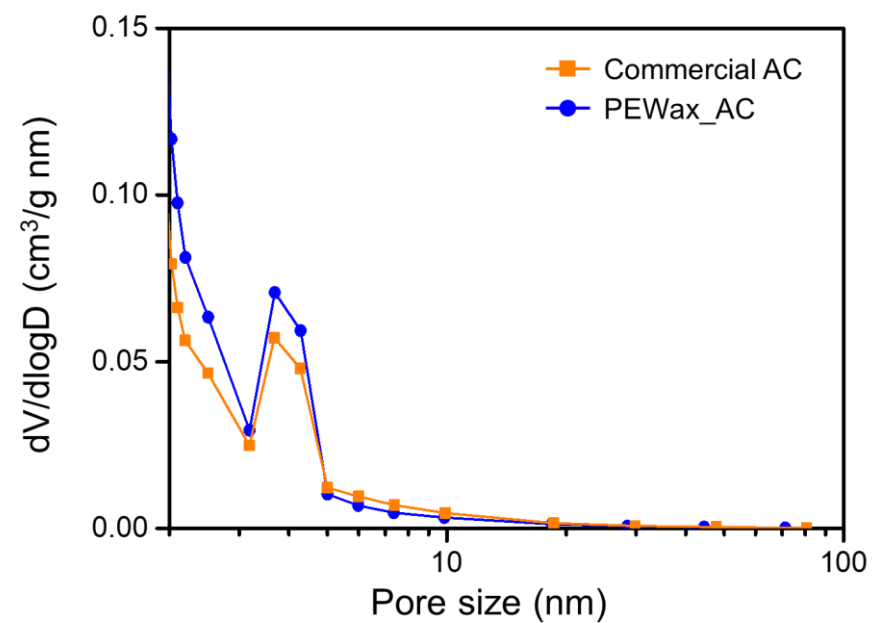


Figure S5. Raman spectra of PEWax\_AC and commercial activated carbon

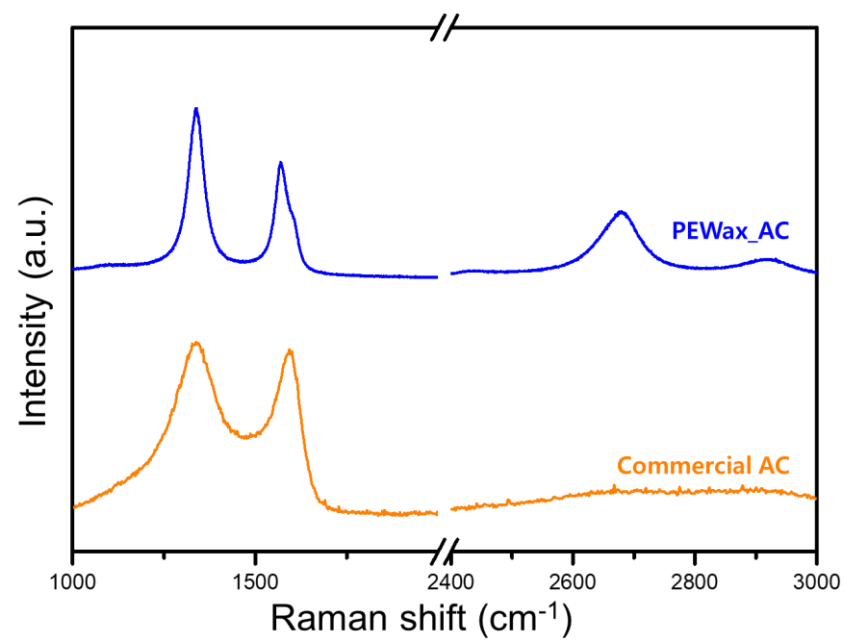
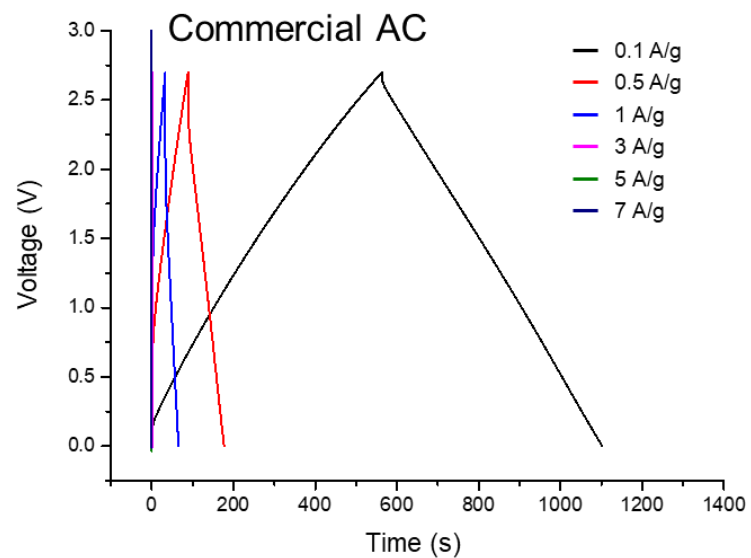


Figure S6. Galvanostatic charge–discharge (GCD) profiles of (a) commercial activated carbon and (b) PEWax\_AC electrodes at different current densities

a



b

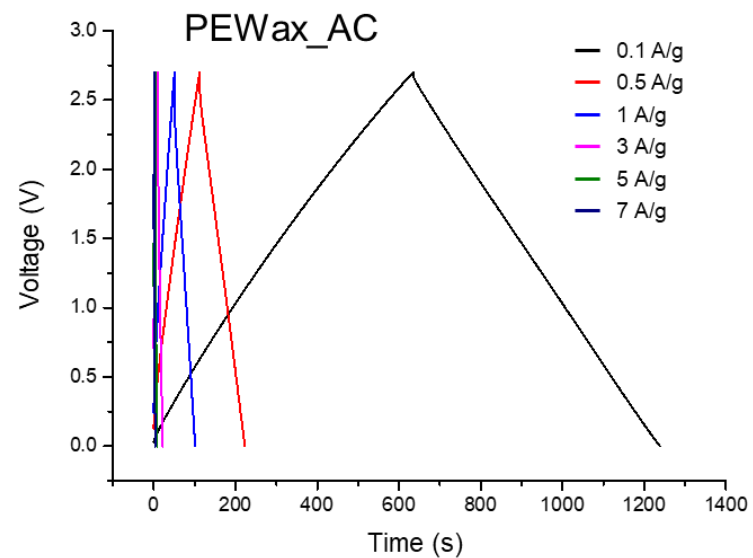


Table S1. Material specifications of the commercial linear low-density polyethylene (LLDPE) employed for stabilization experiments

Sample	Manufacturer	Nationality	Model
LLDPE	Lotte Chemical	Republic of Korea	UL814



Table S2. Volumetric capacitance of PEWax\_AC and commercial activated carbon in supercapacitors

Sample	Current density (A/g)					
	0.1	0.5	1	3	5	7
	Volumetric capacitance (F/cm <sup>3</sup> )					
Commercial AC	23.8	19.4	14.5	1.7	0.1	<0.1
PEWax_AC	24.6	22.6	20.7	13.2	8.1	4.6

Table S3. Four-probe electrical conductivity of EDLC electrodes prepared from commercial AC and PEWax\_AC

Sample	Commercial AC	PEWax_AC
Resistance (Ohm/sq.)	843.2	380.4