Supporting Information

Co-recovery of tungsten and lanthanum from photovoltaic tungsten-based busbars scrap by molten salt electrolysis

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Results and Discussion

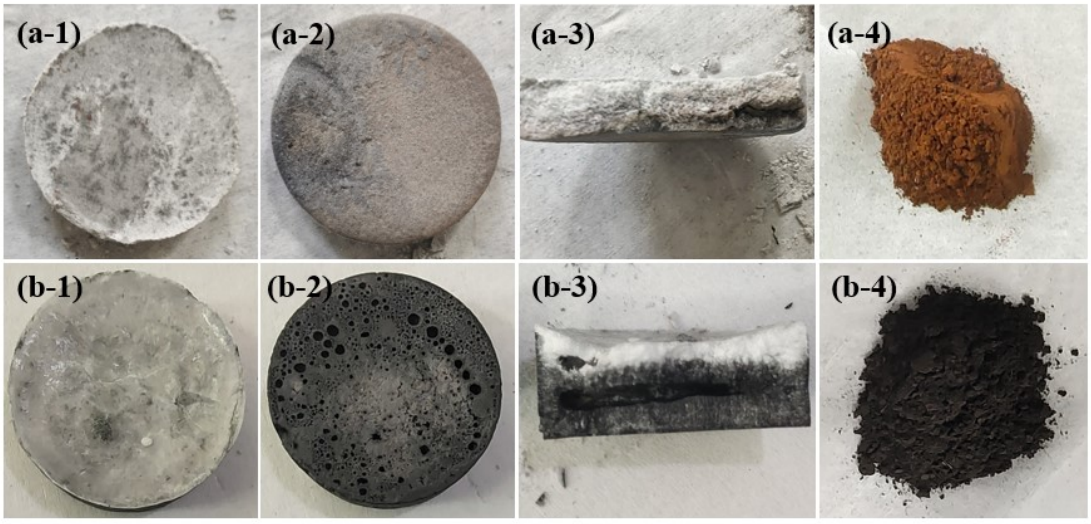

Fig. S1 Photos of molten salts (surface, bottom and cross section) and products (after washing and drying), (a-1) ~ (a-4) Experiments using tungsten rod as cathode, (b-1) ~ (b-4) Experiments using graphite crucible as cathode.

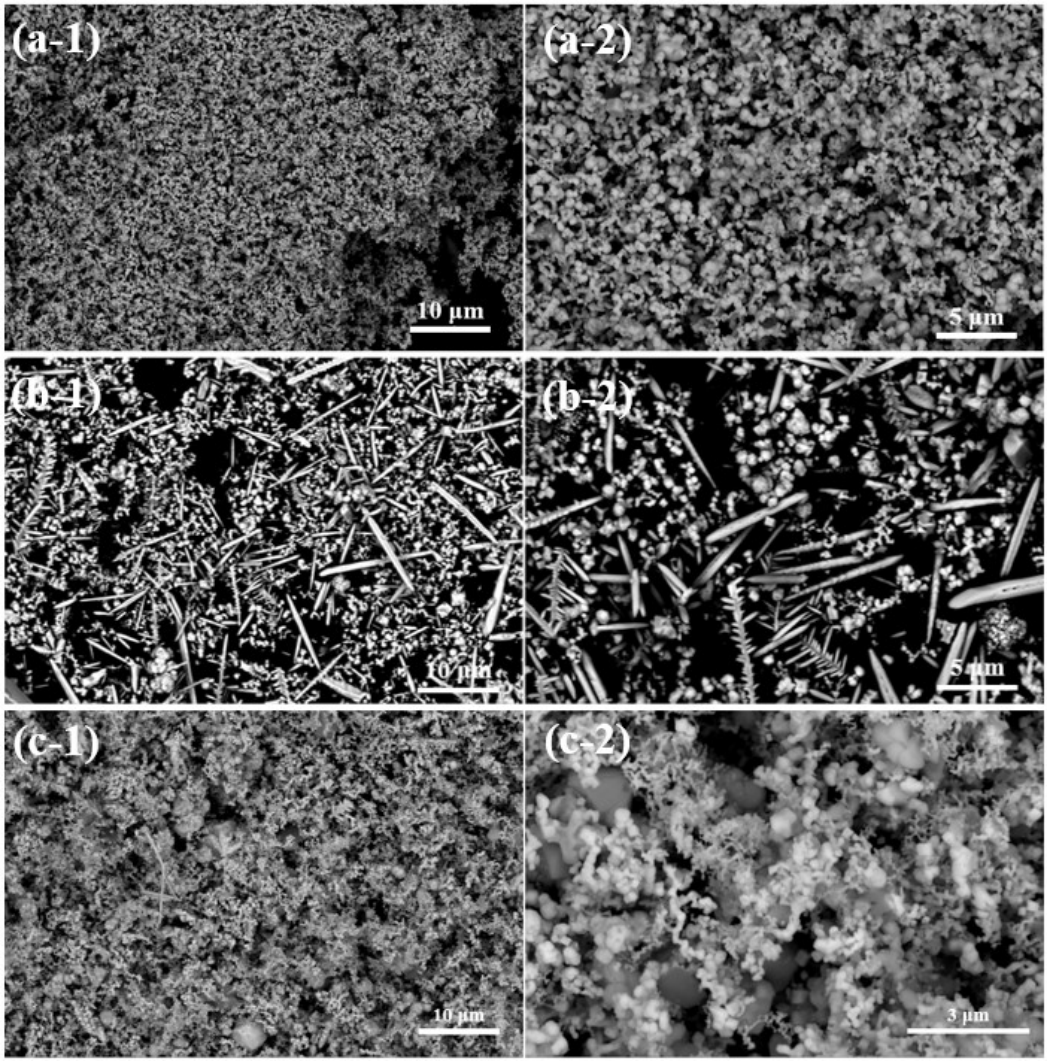

Fig. S2 (a) Experiment of tungsten rod as anode using graphite crucible cathode, (a-1) 2000 x, (a-2) 5000 x, (b) Experiment of tungsten wire as anode using graphite crucible cathode (no use of anode basket), (b-1) 2000 x, (b-2) 5000 x, (c) Experiment of tungsten wire as anode using graphite crucible cathode (use anode basket), (c-1) 2000 x, (c-2) 10000 x.

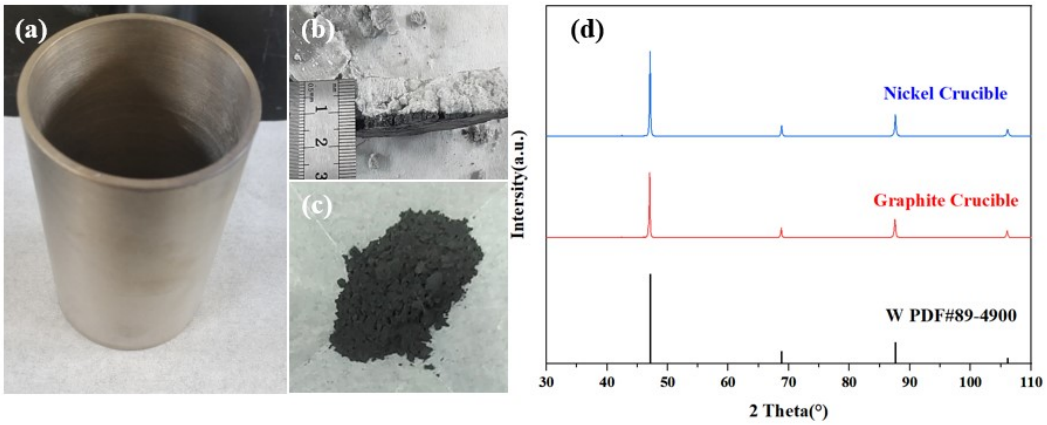

Fig. S3 Experiment with tungsten wires as the anode, nickel crucible as the cathode and no anode basket, (a) Photo of nickel crucible, (b) Photo of molten sats (cross section) after experiment, (c) Product after washing and drying, (d) XRD patterns of the product.

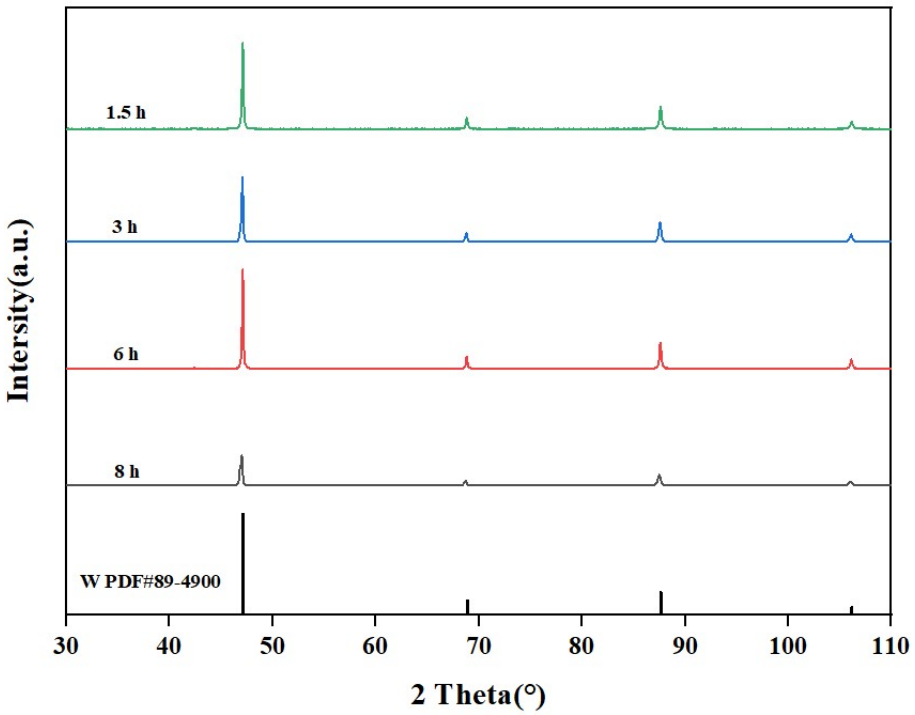

Fig. S4 XRD patterns of products at different electrolysis duration (tungsten wires as the anode and graphite crucible as the cathode, and no anode basket).

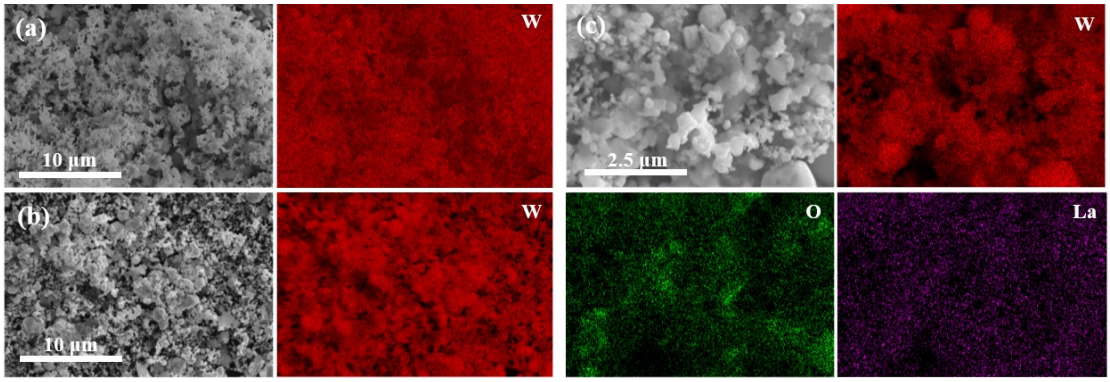

Fig. S5 Experiments with tungsten wire as the anode in anode basket and graphite crucible as the cathode, SEM and EDS mapping of regenerated tungsten at different duration, (a) 1 h, (b) 2 h, (c) 8 h.

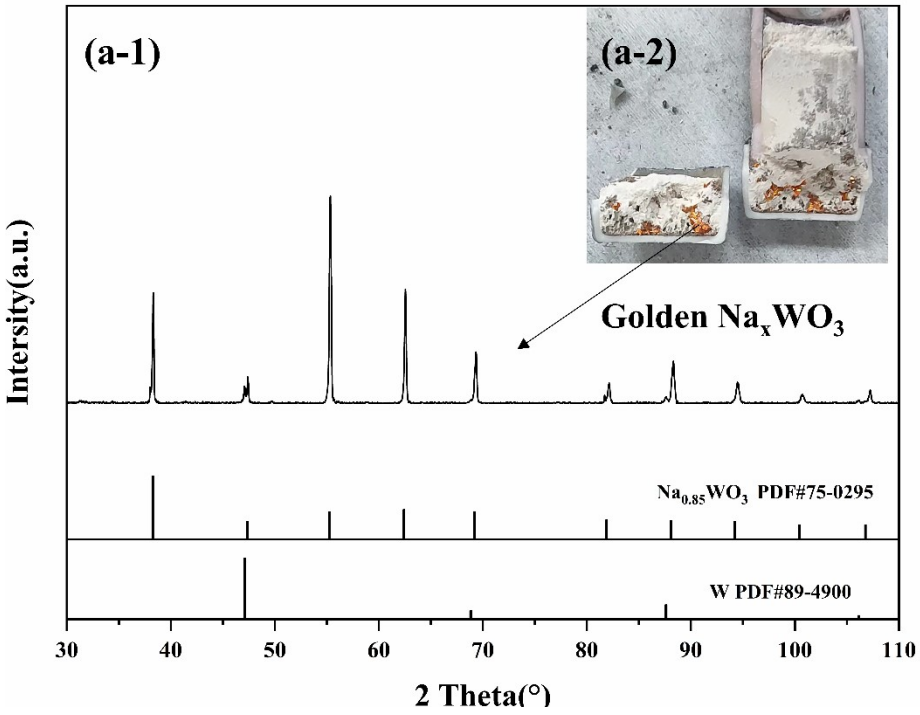

Fig. S6 (a-1) XRD patterns of Na_xWO_3 in anode basket, (a-2) Photo of anode basket after experiment (cross section).

Table S1. GDMS of virgin busbar and regenerated tungsten powders.

Samples	Elemental content (μg/g)			
	Na	W	La	Al
Product *(Tungsten rod as cathode)*	2.49 %	97.01 %	148	0.15 %
Product *(Graphite crucible as cathode)* *(without anode basket)*	176	99.65 %	0.29 %	11
Product *(Graphite crucible as cathode)* *(Equip anode basket)*	288	99.23 %	0.28 %	0.34 %
Virgin busbar	23	99.75 %	0.21 %	1.3

Table S2. Detailed experimental data with tungsten wire as the anode in anode basket, graphite crucible as the cathode and electrolysis duration of 3 h.

Experimental conditions	Quality of anode dissolution (g)	Quality of product (g)	Current efficiency (%)	W Yield (%)	La Yield (%)
Without anode basket	3.806 g	3.704 g	90.02 %	97.22 %	/
Equip anode basket	3.550 g	1.910 g	46.42 %	53.52 %	71.73 %

* In the absence of anode basket, La falls off as anode sludge, thus the yield is not calculated.