Supplementary Materials

Ultra-strong tungsten wire with high-proportion coincidence site lattice grain boundary

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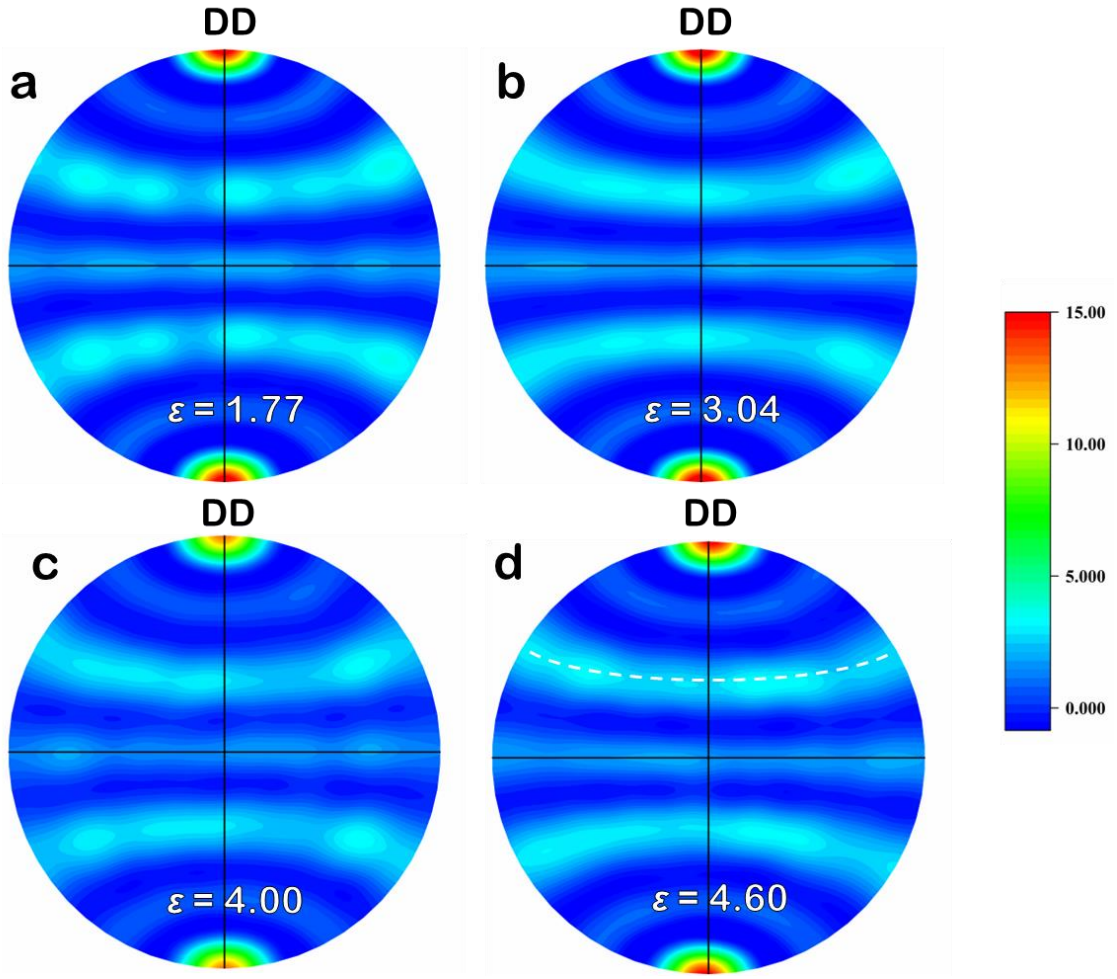

Figure S1 Texture analysis of the tungsten wires. Pole figure of <110>: a) $\varepsilon = 1.77$, b) $\varepsilon = 3.04$, c) $\varepsilon = 4.0$, d) $\varepsilon = 4.6$

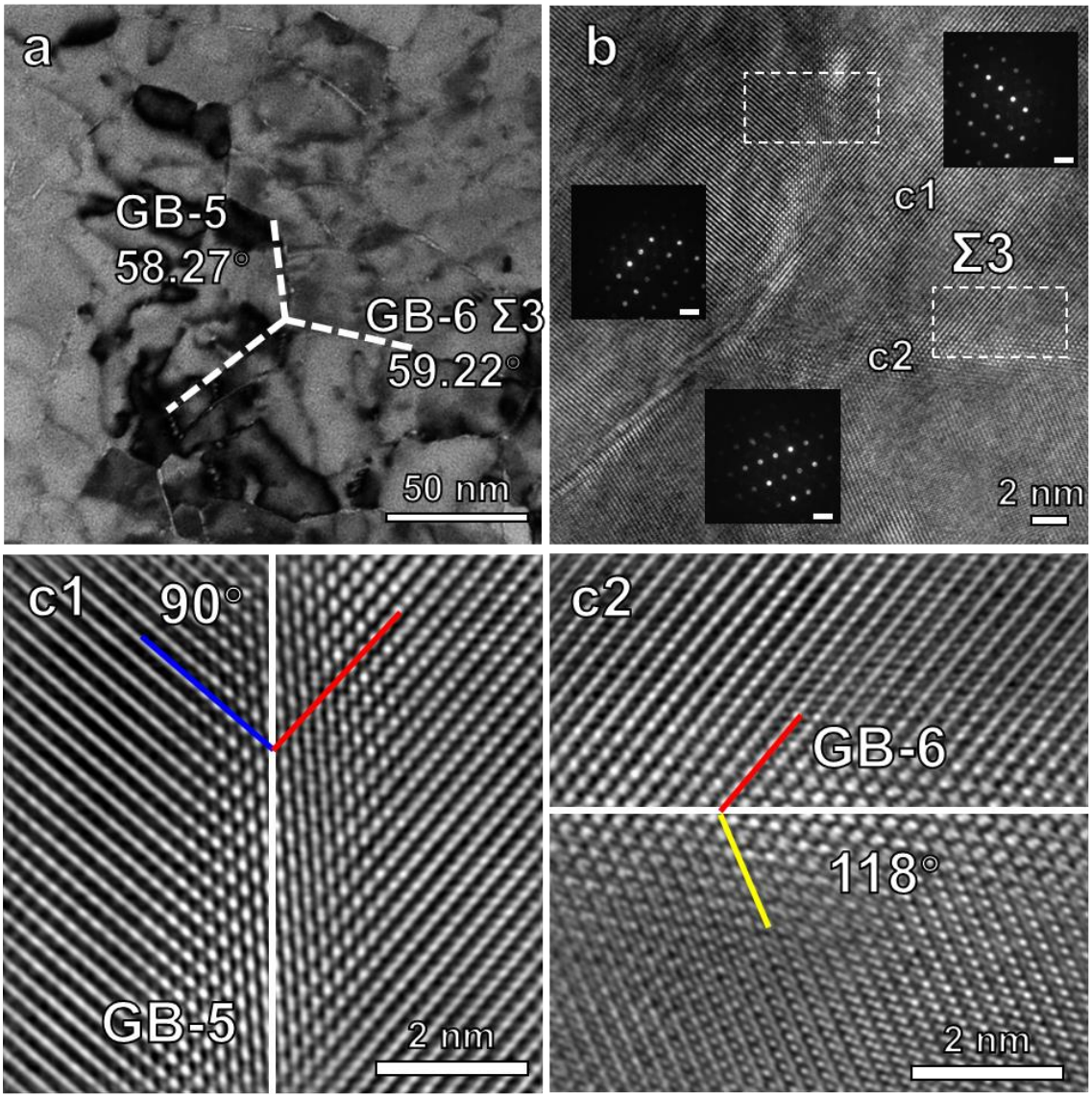

Figure S2. TEM micrographs of the triple junctions marked: a) - c) TEM and HRTEM micrographs of GB-5 and GB-6; The scale bar for nano beam diffraction patterns is 5 nm^{-1}.

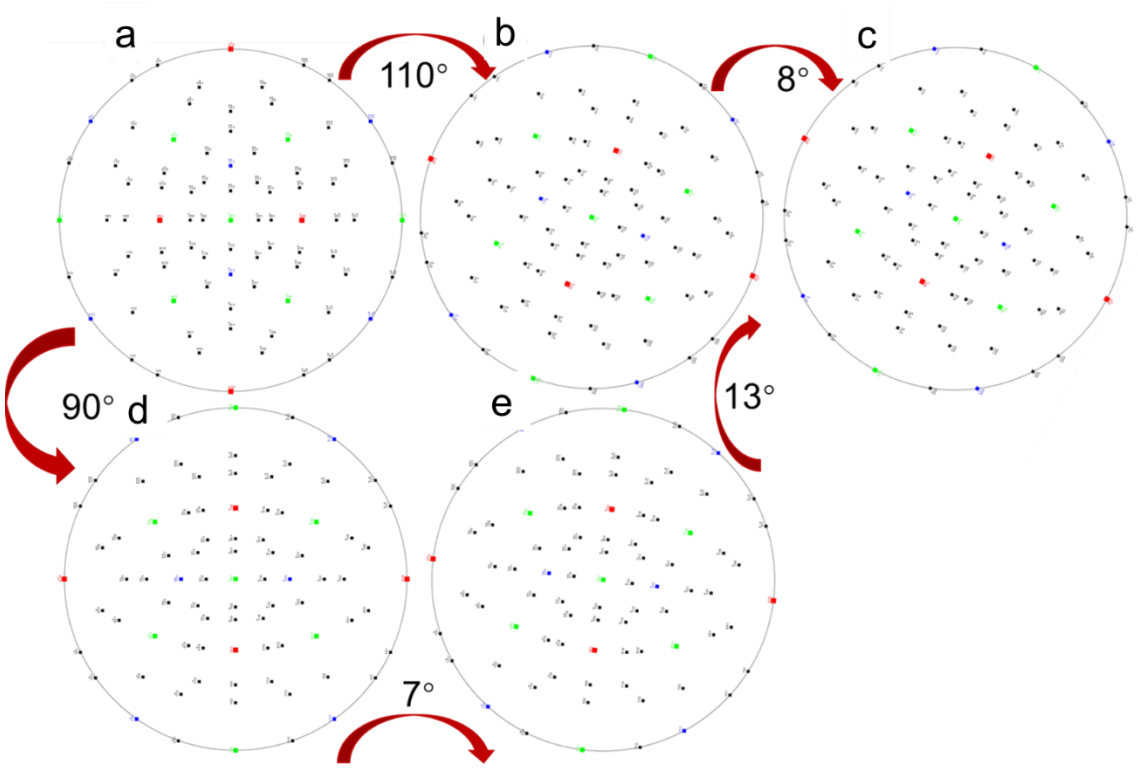

Figure S3. Tungsten lattice projection along the [110] direction (a); rotated around the [110] direction with different angles (b-e).

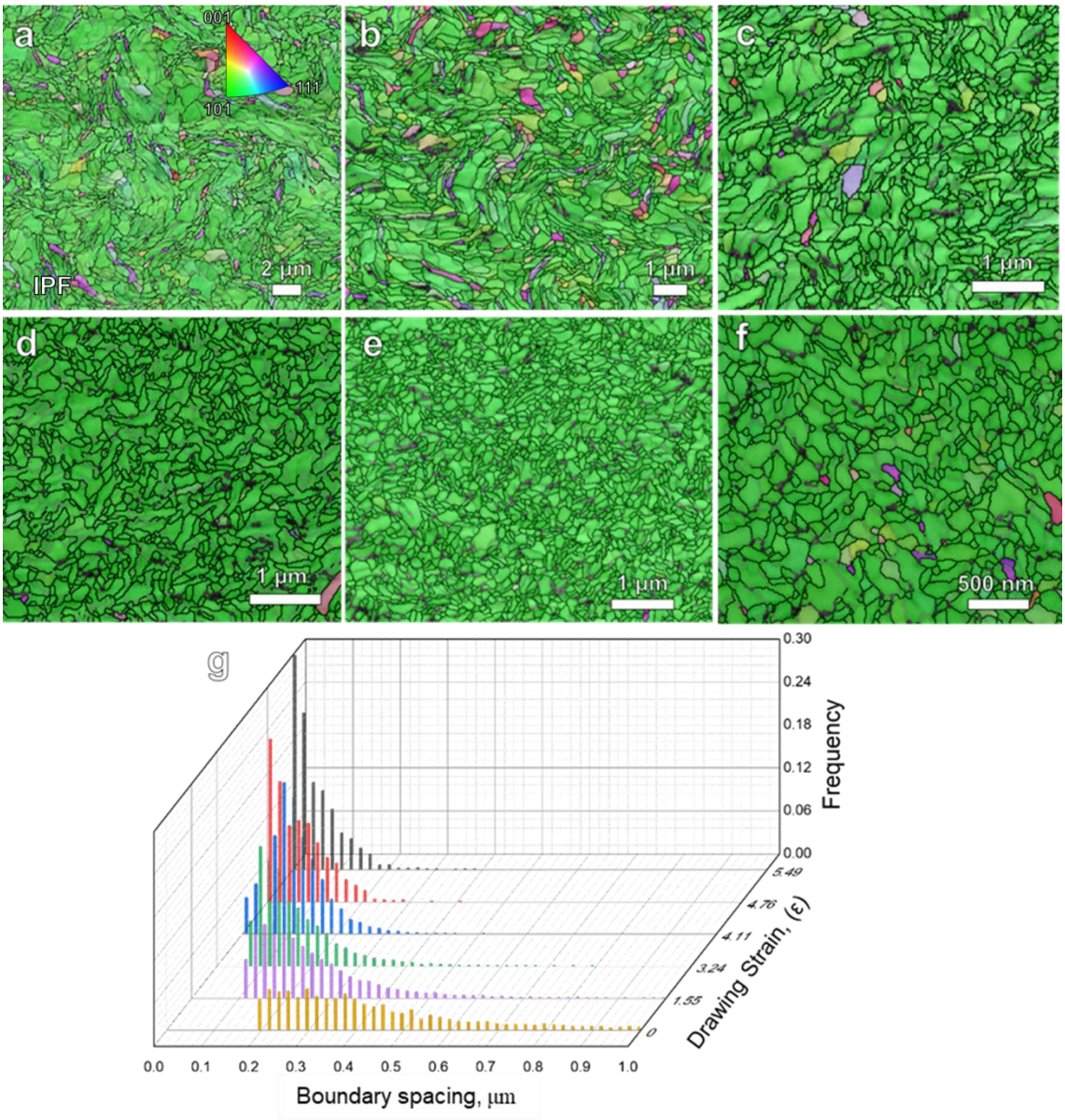

Figure S4. EBSD micrographs (IPF coloring based on the drawing direction) of the cross-sections of the single phase tungsten wire at different strains: a) ε =0; b) ε =1.55; c) ε =3.24; d) ε =4.11; e) ε =4.76; f) ε =5.49; and g) the distribution of the grain size.

Table S1. Information of the single phase tungsten wire

Drawing strain	0	1.55	3.24	4.11	4.76	5.49
Diameter (μm)	390	180	77	50	36	25
Boundary spacing (nm)	497	235	155	124	67	51
Yield strength $\sigma_{0.2}$, MPa	1997	2589	3159	3538	4137	4809

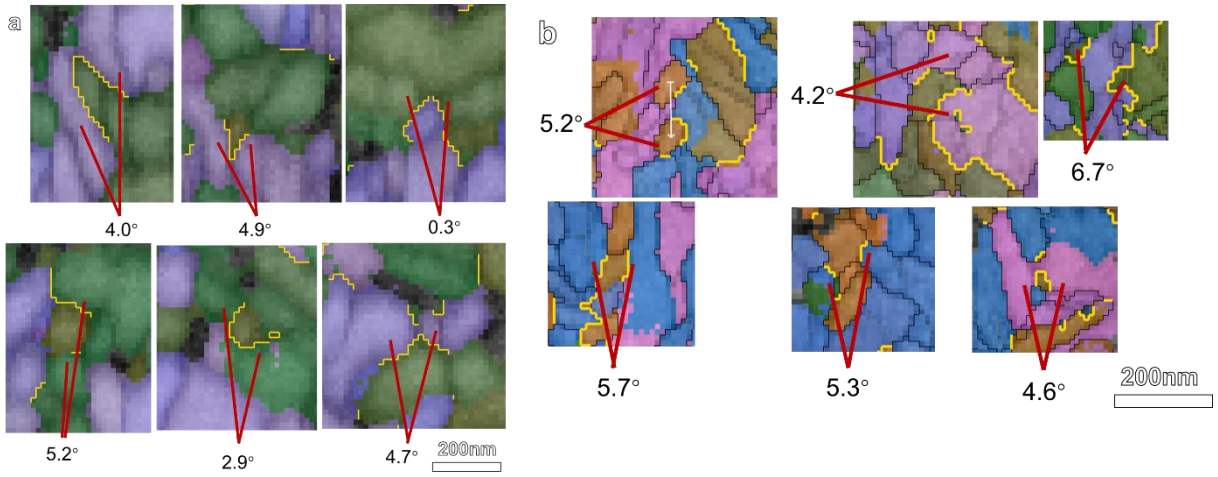

Figure S5. EBSD micrographs (Euler coloring) of the cross-sections of the CeO-addition tungsten wire at different strains: a) ε =3.04; b) ε =4.87.

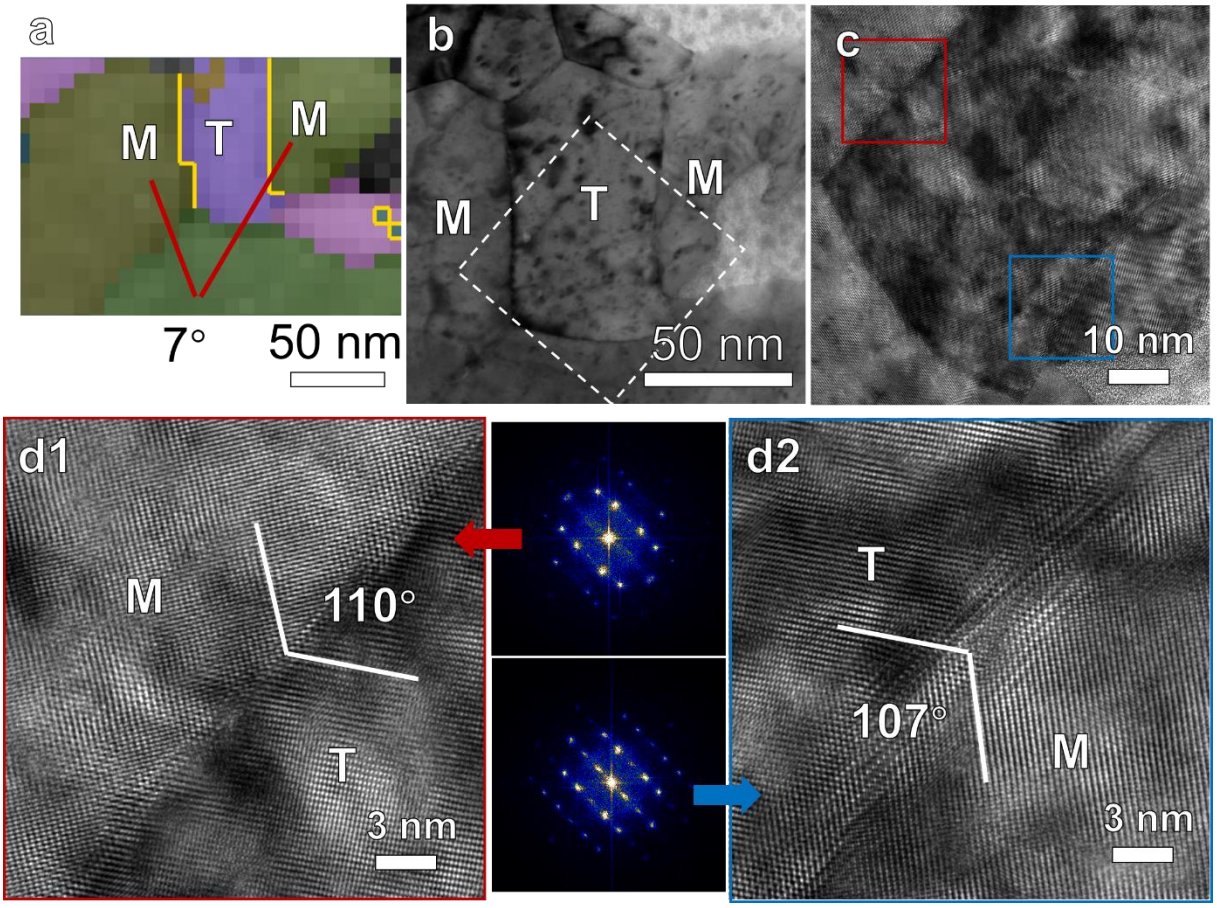

Figure S6. TKD maps and TEM micrographs of single phase tungsten wire at ε=5.49 taken from the cross section a) TKD Euler coloring map. Yellow line: Σ3 boundary b) Corresponding bright field STEM micrograph; c) Corresponding HRTEM micrograph, d(1-2) atomic scale structure and corresponding FFT analyisis of the two Σ3 twin boundaries.