

Supplementary Information (Inorganic Chemistry Frontiers)

**Dynamic evolution of high-temperature molten salt electrolysis of titanium
under different operational conditions**

Handong Jiao^a, Mengjun Liu^a, Yang Gao^b, Jianxun Song^{c,*}, Shuqiang Jiao^{b,*}

^aInstitute of Advanced Structure Technology, Beijing Institute of Technology, Beijing
100081, P R China

^bState Key Laboratory of Advanced Metallurgy, University of Science and
Technology Beijing, Beijing, 100083, P R China

^cZhongyuan Critical Metals Laboratory, Zhengzhou University, Zhengzhou
University, Zhengzhou 450001, P R China

Email: sjiao@ustb.edu.cn (S. Jiao); jianxun.song@zzu.edu.cn (J. Song)

Keywords: Molten salt electrochemistry, X-ray computer microtomography,
Titanium electrolysis, Pulse electrolysis, Concentration polarization

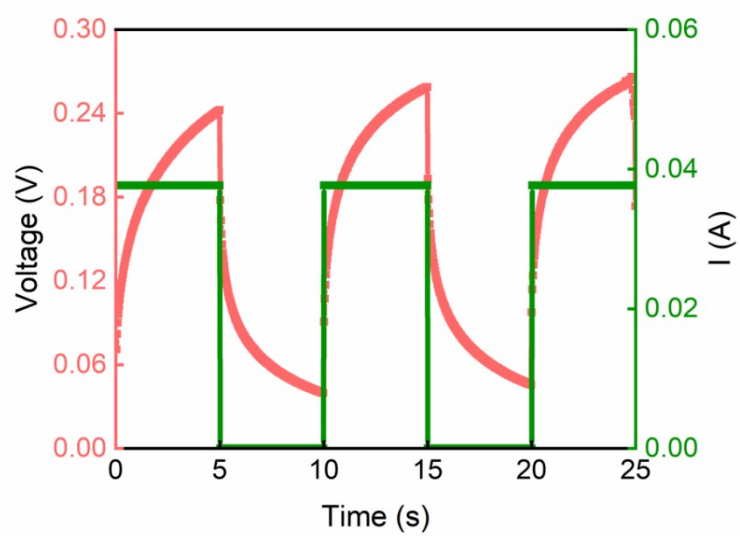


Fig. S1. The voltage and current profiles of pulse electrolysis

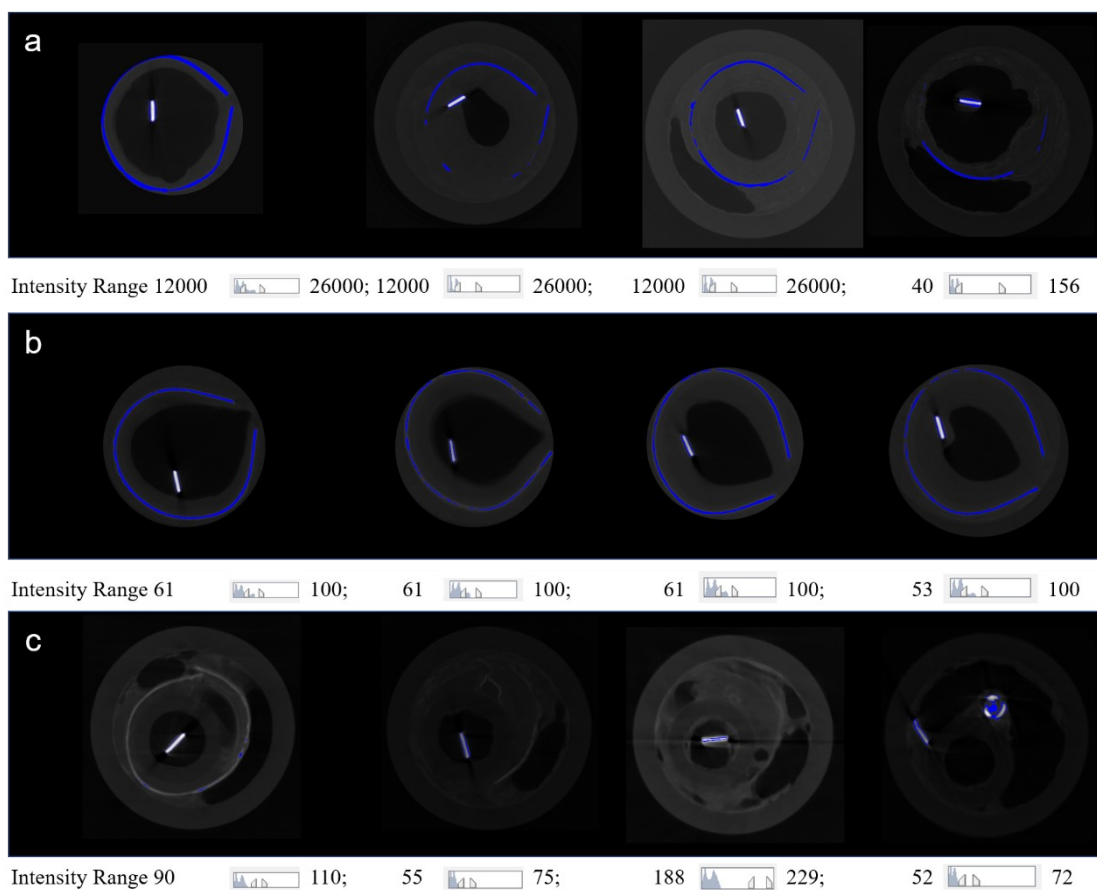


Fig. S2. The specific value of threshold segmentation in avizo software. Threshold segmentation value of titanium coating under (a) pulse electrolysis at 0.3A cm^{-2} current density, (b) direct current (DC) electrolysis at 0.3A cm^{-2} current density, and (c) pulse electrolysis at 0.1A cm^{-2} current density.

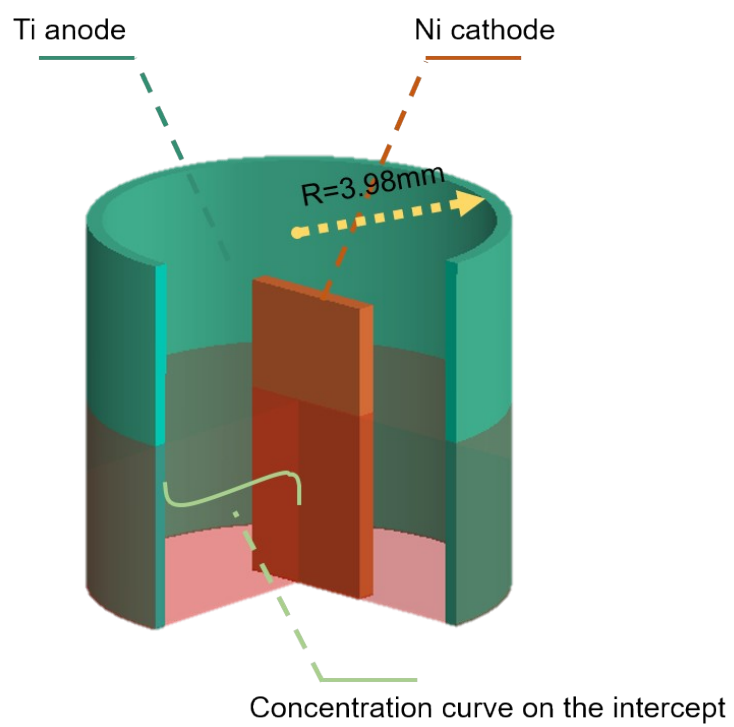


Fig. S3. Schematic diagram of electrolysis system.

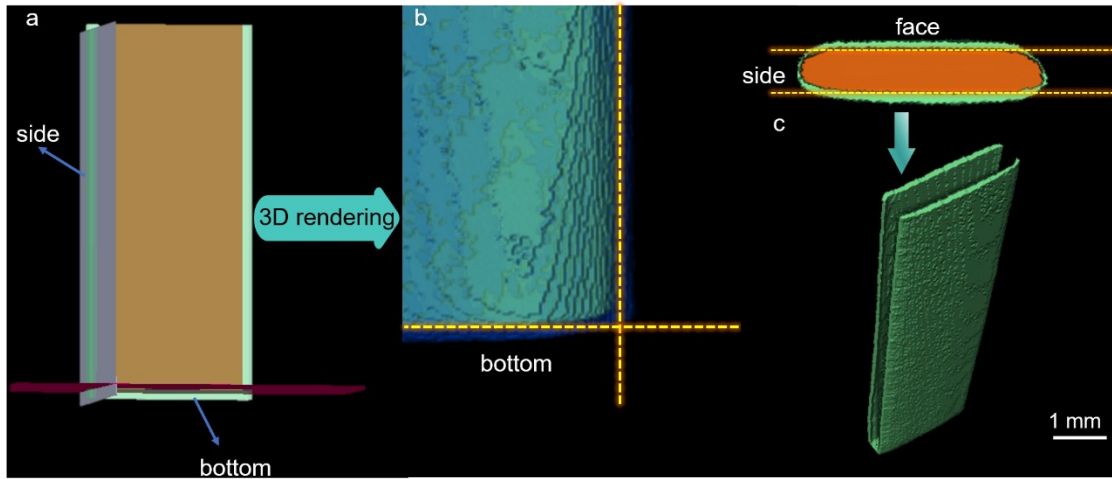


Fig. S4. (a) Schematic diagram of the segmentation of the cathode part; (b) 3D rendering of the cathode segmentation; (c) Titanium coating obtained by division.

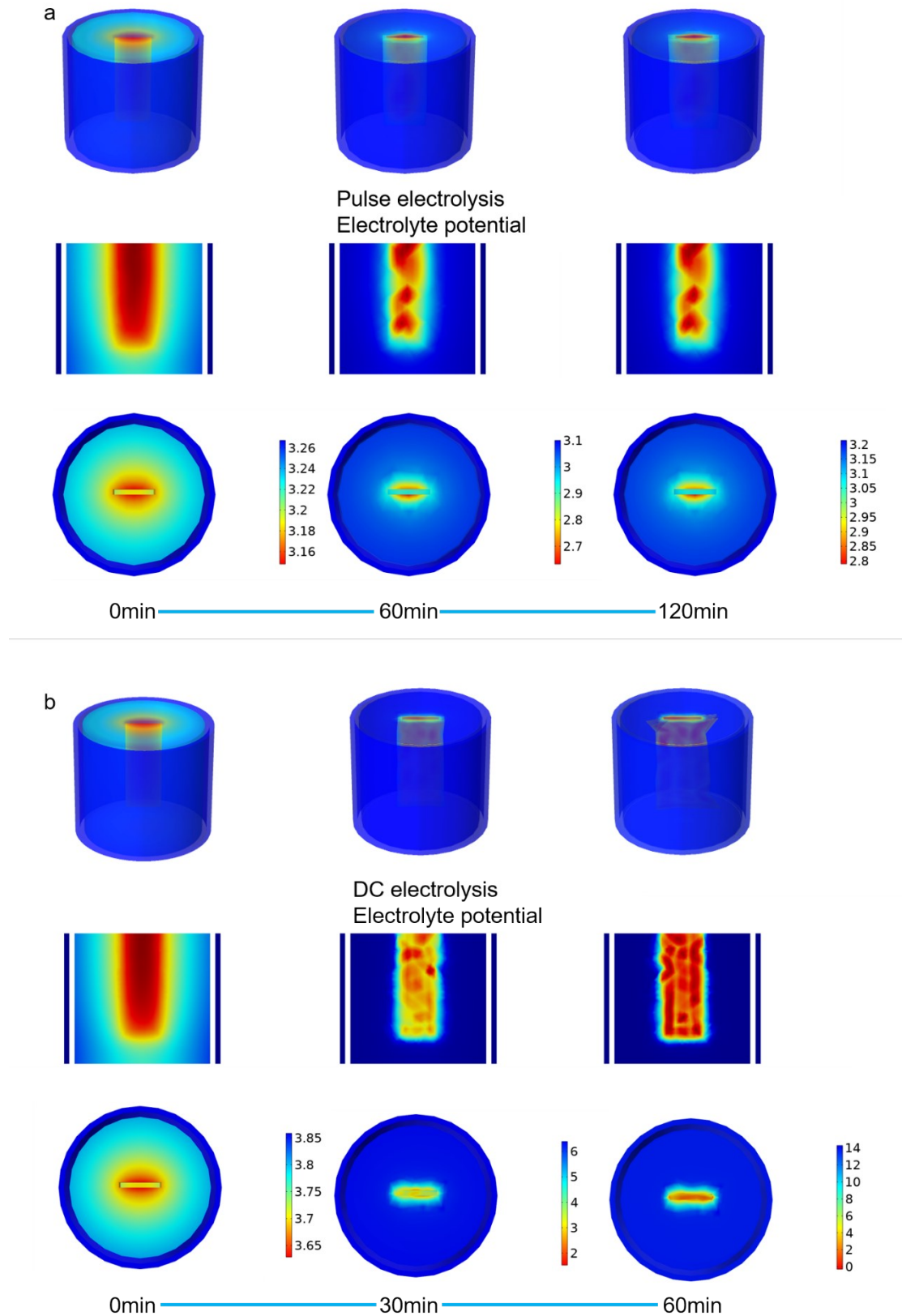


Fig. S4. (a) Electrolyte potential distribution of pulsed electrolysis under simulation;

(b) Electrolyte potential distribution of DC electrolysis under simulation

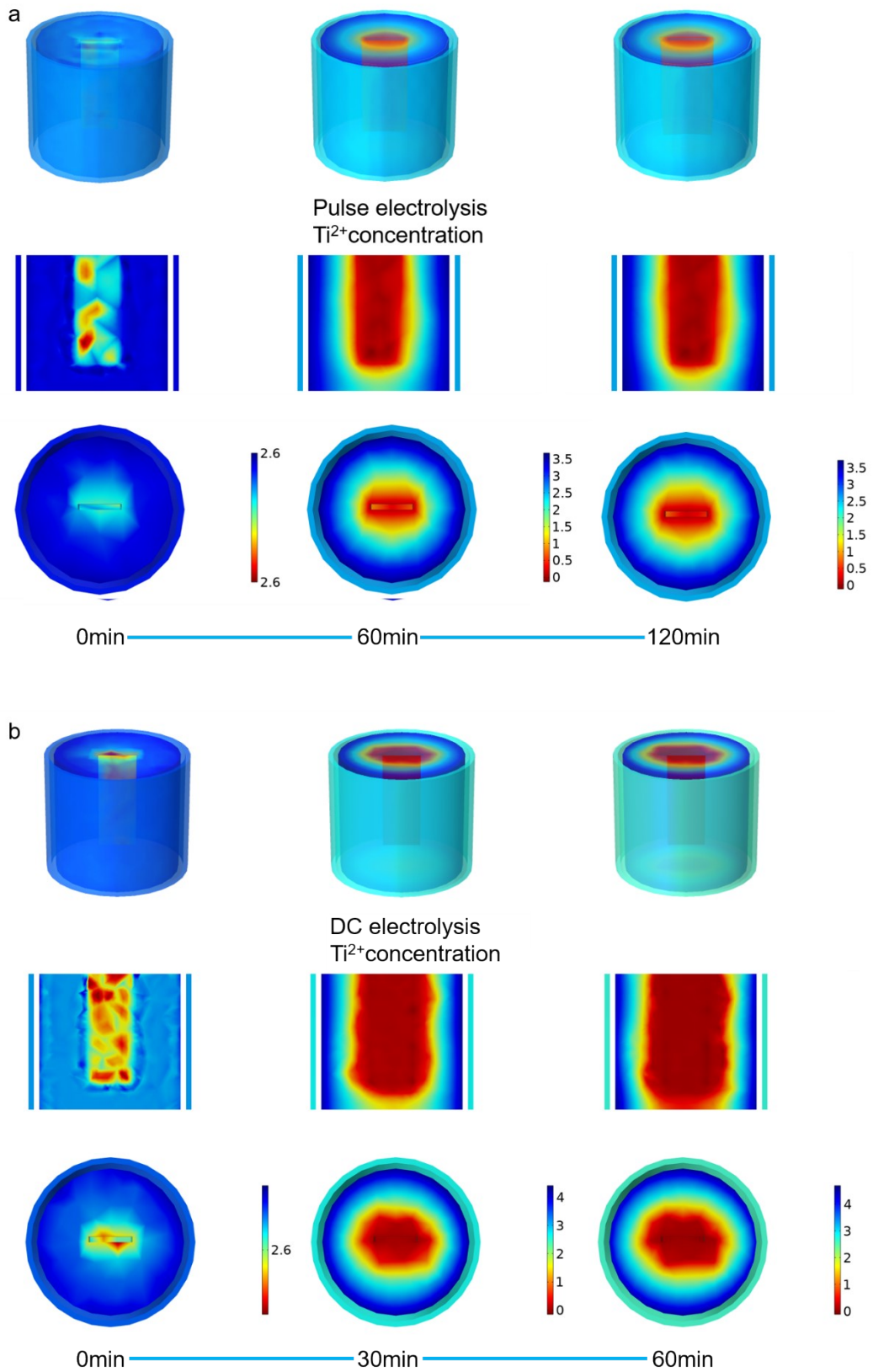


Fig. S5. (a) Ti²⁺ concentration distribution of pulsed electrolysis obtained by simulation; (b) Ti²⁺ concentration distribution of DC electrolysis obtained by simulation.

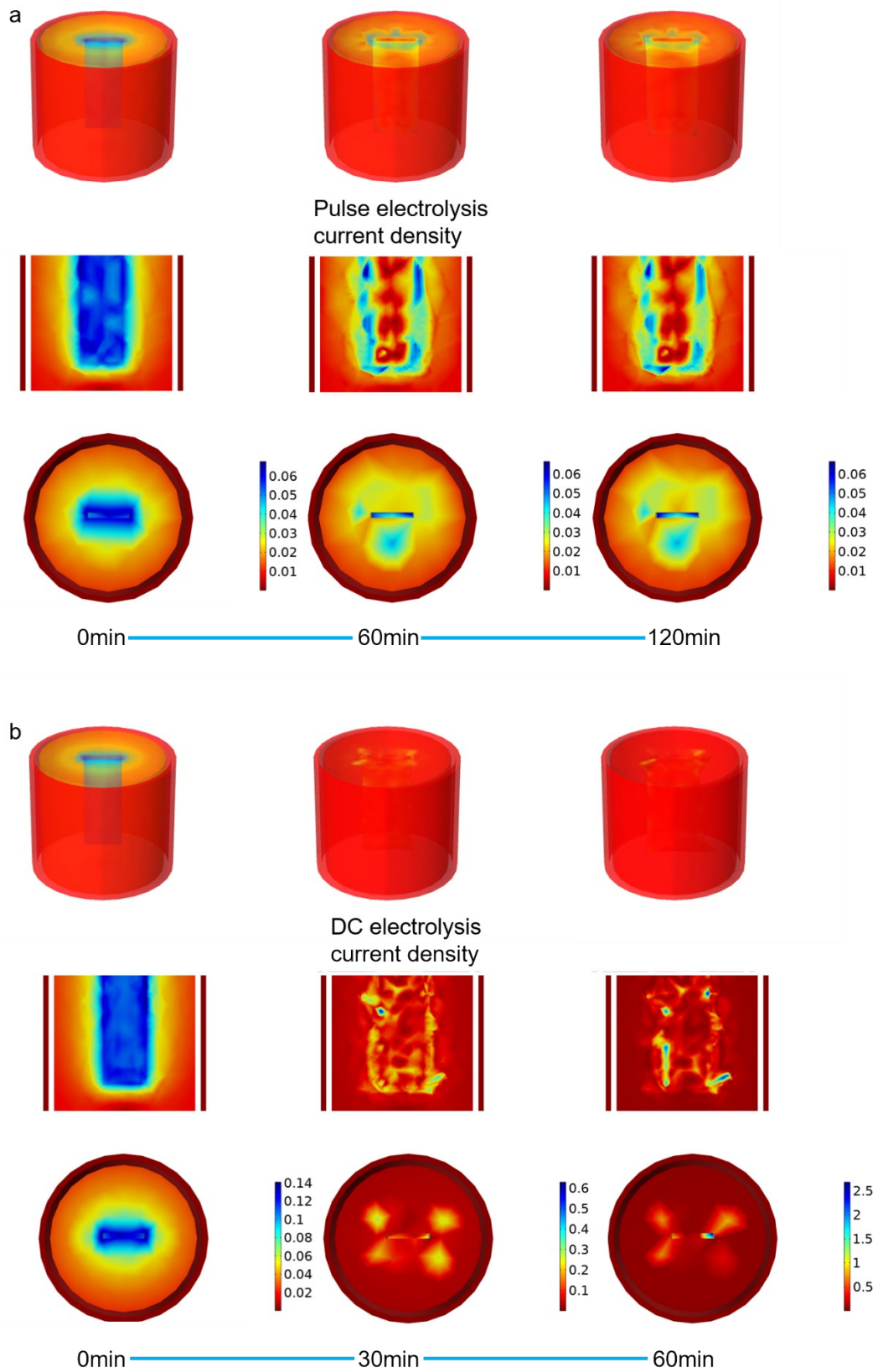


Fig. S6. (a) Current density distribution of pulsed electrolysis under simulation; (b) Current density distribution of DC electrolysis under simulation.

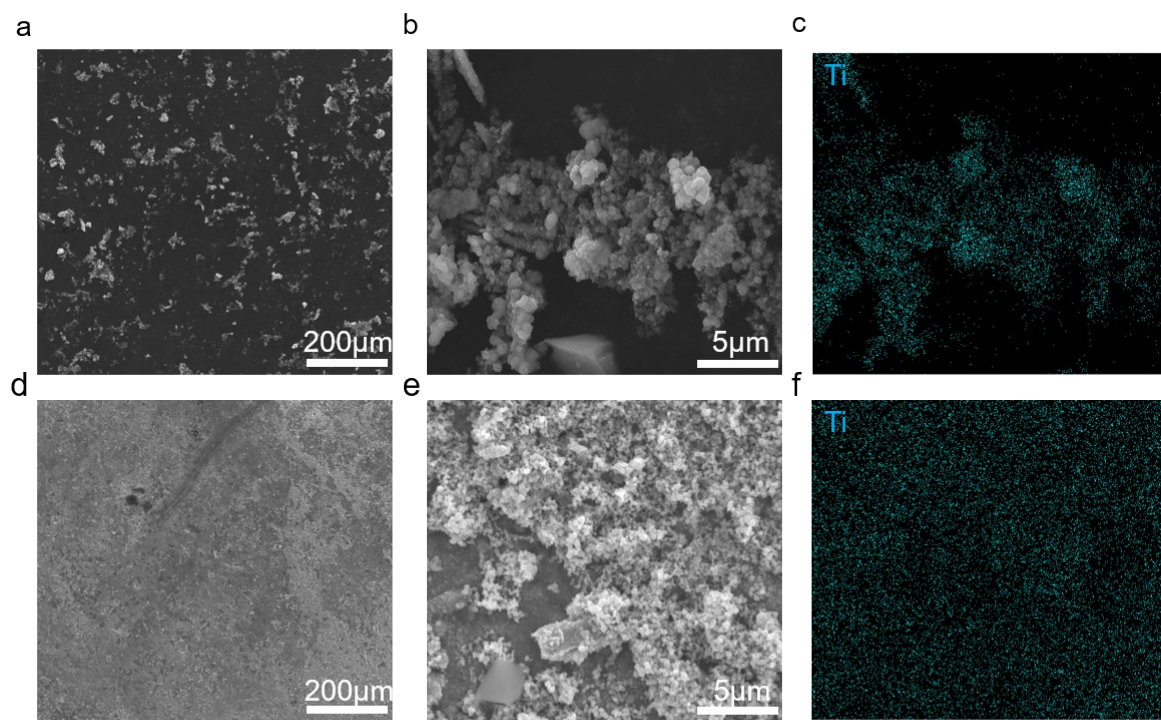


Fig. S7. (a) SEM picture of cathode under pulse electrolysis; (b) SEM picture of cathode under pulse electrolysis; (c) EDS mapping of cathode under pulse electrolysis; (d) SEM picture of cathode under DC electrolysis; (e) SEM picture of cathode under DC electrolysis; (f) EDS mapping of cathode under DC electrolysis.

Movie S1. Variation of titanium ions concentration under pulse electrolysis.

Movie S2. Variation of titanium ions concentration under DC electrolysis.