

TiO₂ Nanotubular Arrays Decorated with Ultrafine Ag Nanoseeds

Enabling Stable and Dendrite-free Lithium Metal Anode

*Yulei Li,^a Shenhao Li,^a Jiewu Cui,^a Jian Yan,^a Hark Hoe Tan,^b Jiaqin LIU,^{*a} Yucheng Wu^{*a}*

^a Institute of Industry & Equipment Technology, School of Materials Science and Engineering, Engineering Research Center of Advanced Composite Materials Design & Application of Anhui Province, Key Laboratory of Advanced Functional Materials & Devices of Anhui Province, Hefei University of Technology, Hefei, 230009, China

^b Department of Electronic Materials Engineering, Research School of Physics and Engineering, Australian National University, Canberra, ACT 2601, Australia

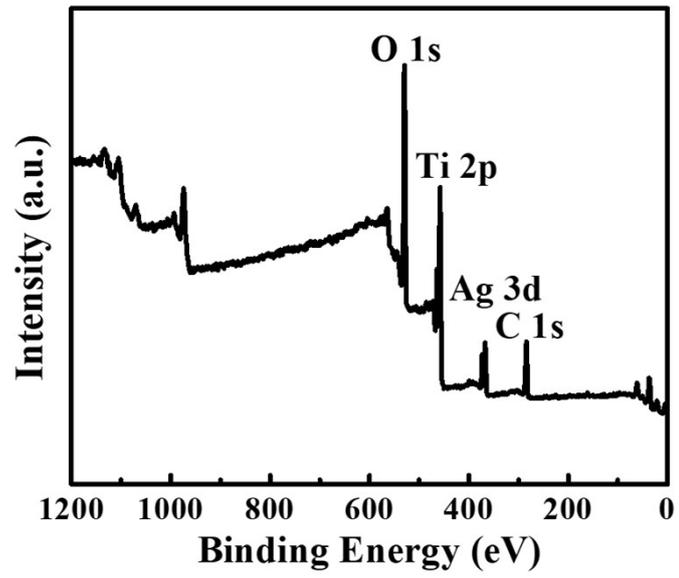


Fig.S1 XPS spectrum of Ag@TNTAs/Ti

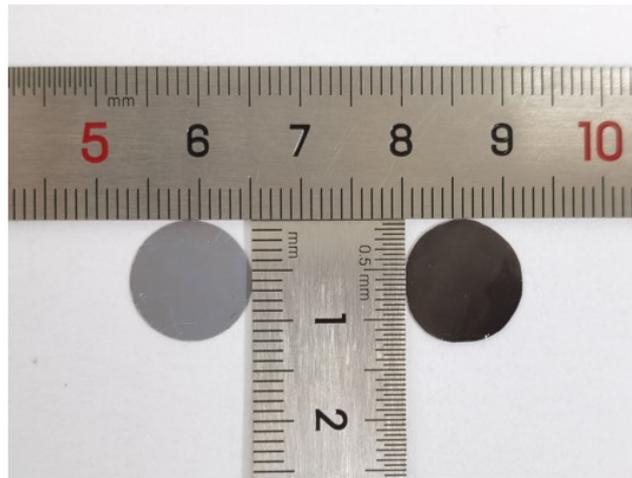


Fig.S2 Photographs of TNTAs/Ti (left) and Ag@TNTAs/Ti (right).

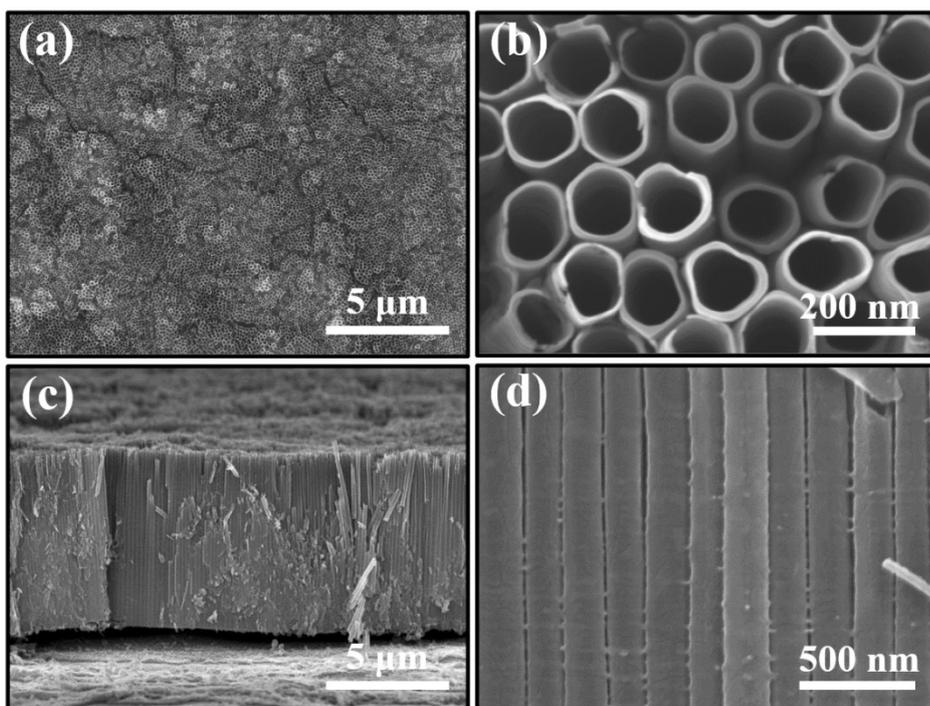


Fig.S3 SEM images of TNTAs/Ti.

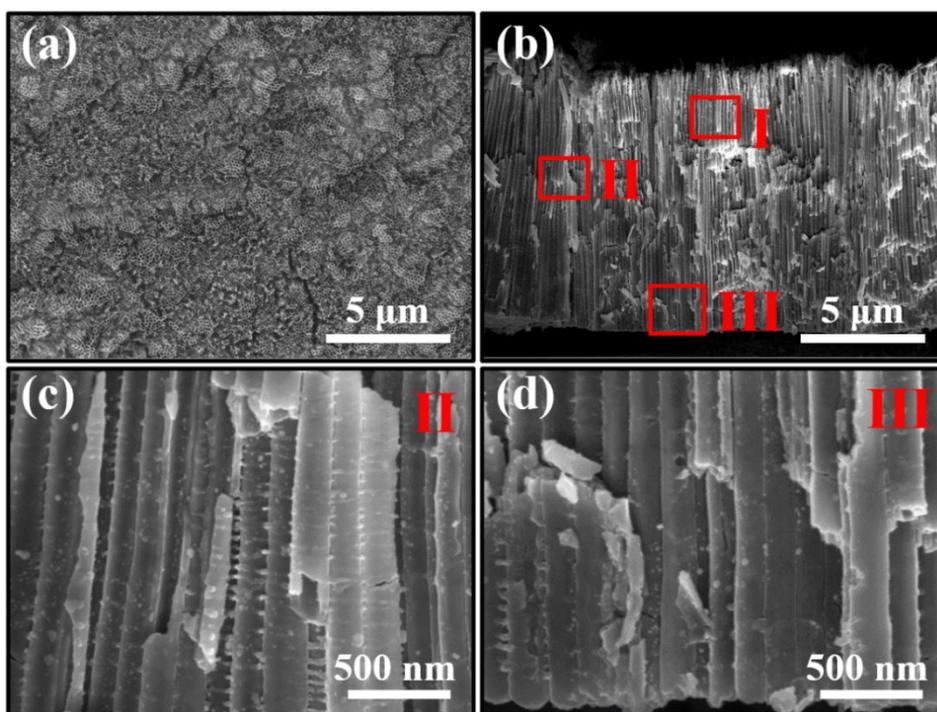


Fig.S4 (a) Top and (b-d) side view SEM images of Ag@TNTAs/Ti.

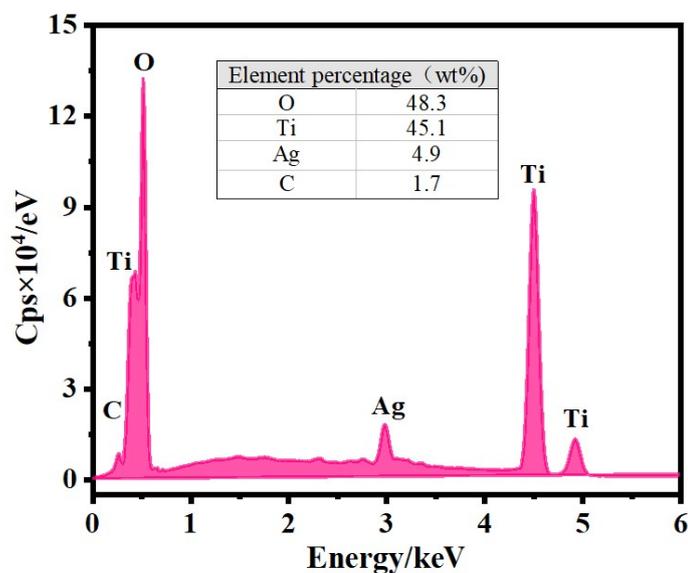


Fig.S5 EDX spectrum of Ag@TNTAs/Ti.

(Note: During the preparation of TNTAs/Ti by anodization, a small amount of ethylene glycol (EG) remains on the surface of TiO₂ nanotubes in the as-prepared TNTAs/Ti even after repeated rinsing with ethyl alcohol and water, and then, the EG is converted to carbon-contained species during subsequent annealing. So, a weak peak assigned to C element appears in the spectrum of Ag@TNTAs/Ti.)

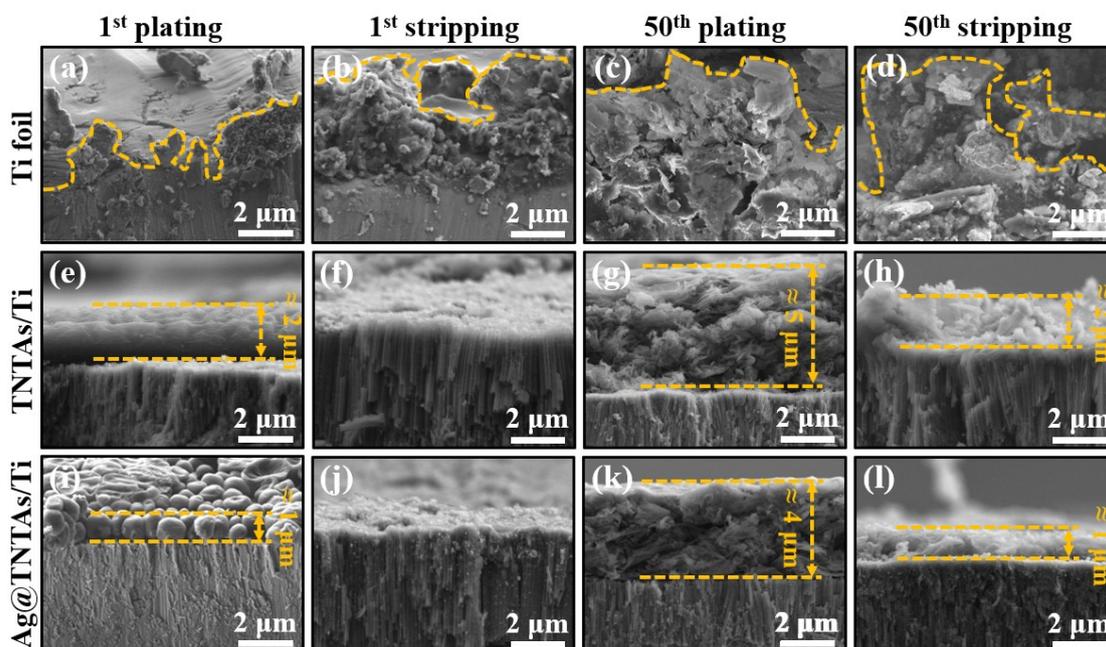


Fig.S6 The deposited Li morphological evolution (side-view) on (a-d) bare Ti foil, (e-h) TNTAs/Ti and (i-l) Ag@TNTAs/Ti substrates at 1 mA cm⁻² with a capacity of 1 mAh cm⁻² at 1st and 50th cycle.

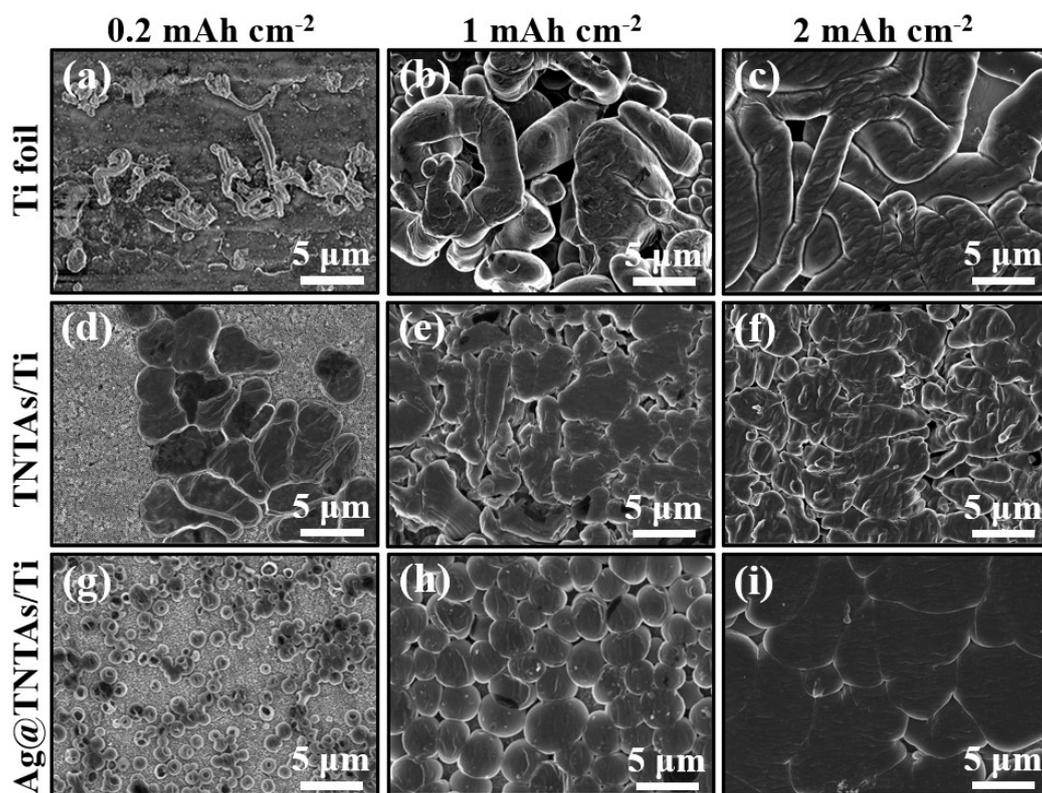


Fig.S7 Top-view SEM images of Ti (a-c), TNTAs/Ti (d-f) and Ag@TNTAs/Ti (g-i): after plating 0.2 mAh cm⁻² (a, d, g), 1 mAh cm⁻² (b, e, h) and 2 mAh cm⁻² (c, f, i) at 1 mA cm⁻².

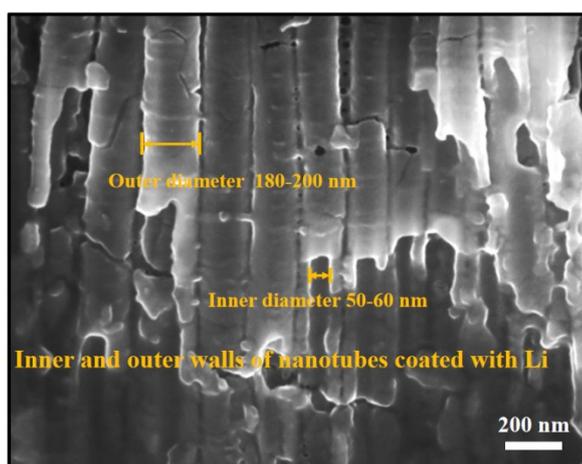


Fig.S8 Side-view SEM image of Ag@TNTAs/Ti after plating 0.2 mAh cm⁻² at 1 mA cm⁻².

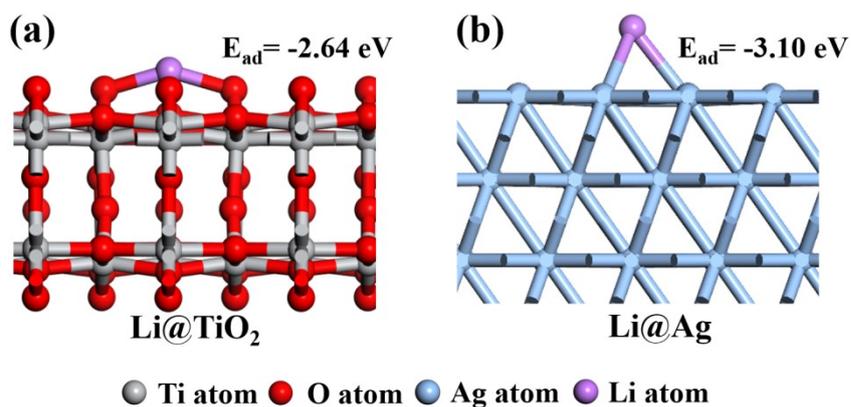


Fig.S9 DFT calculations of the adsorption configurations and adsorption energies of Li atom on (a) TiO₂ and (b) Ag surfaces.

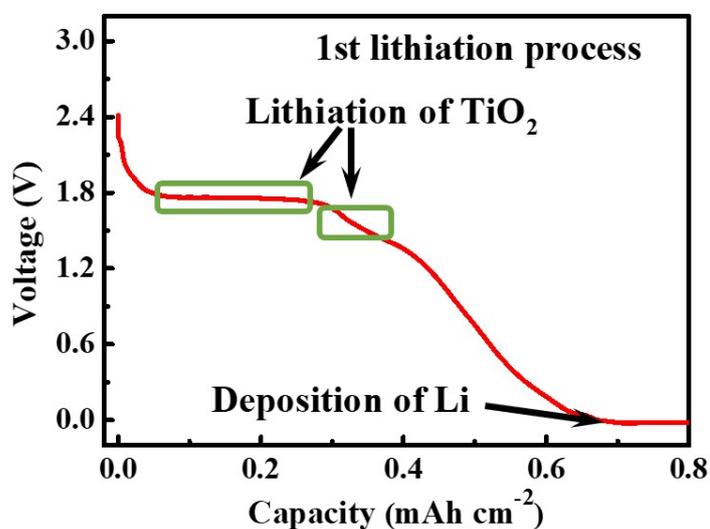


Fig.S10 Voltage profile of initial Li plating on TNTAs/Ti substrate at a current density of 0.5 mA cm⁻².

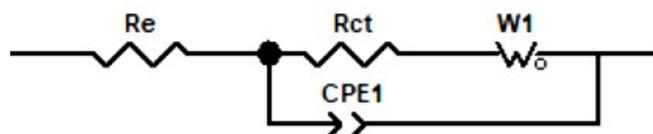


Fig.S11 The corresponding equivalent circuits of Ti|Li, TNTAs/Ti|Li and Ag@TNTAs/Ti|Li symmetric cells.

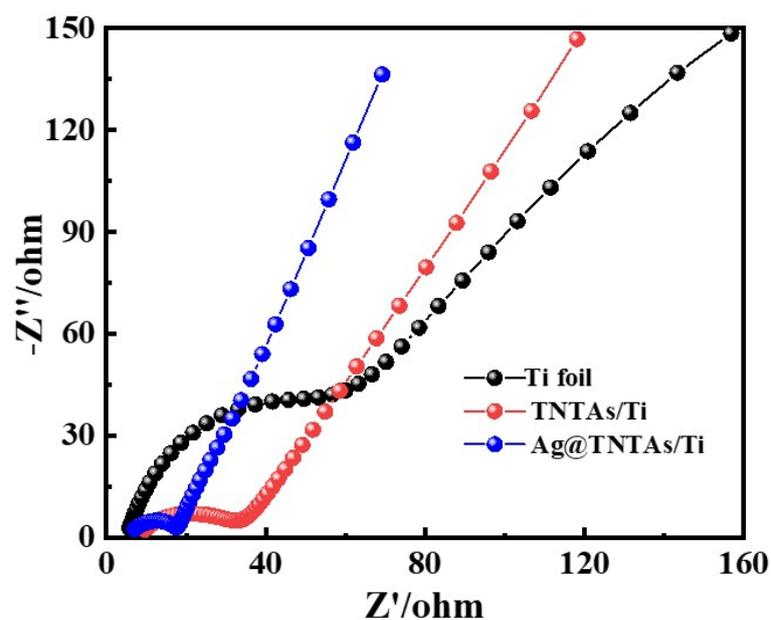


Fig.S12 The electrochemical impedance spectra (EIS) of Ti|Li, TNTAs/Ti|Li and Ag@TNTAs/Ti|Li symmetric cells at 1 mA cm⁻² after 50 cycles.

Table S1 The fitted data of electrochemical impedance spectra for Ti|Li, TNTAs/Ti|Li and Ag@TNTAs/Ti|Li symmetric cells.

50th cycle	Ti	TNTAs/Ti	Ag@TNTAs/Ti
R_{ct}/Ω	73.1	34.7	9.6