Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B

Fabrication of micropatterned TiO_2 nanotube and its protein adsorption/ cell adhesion behaviors

Wanting Peng, Qing Zhang, Zhongmin Qiao, Xiaodong Cao, Xiaofeng Chen, Hua Dong*, Jingwen Liao, ChengyunNing*

NationalEngineering Research Center for Tissue Restoration and Reconstruction, Department of Biomedical Engineering, School of Materials Science and Engineering, South China University of Technology, Guangzhou, China 510641

*Corresponding authors. E-mails: donghua@scut.edu.cn (H. Dong) , imcyning@scut.edu.cn (C.Ning),

(1) Comparison of micropatterned TiO_2 nanotube obtained using different sequences of electrochemical anodization and photolithography in fabrication process.

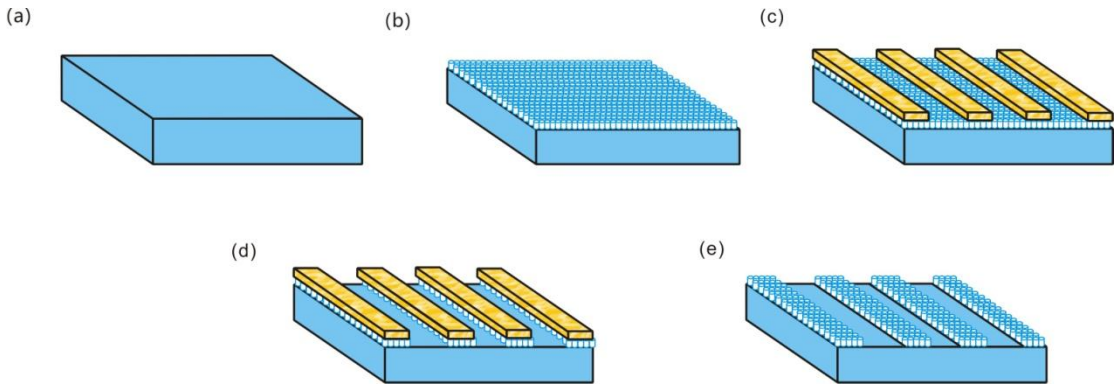

Figure S1. Schematic illustration of patterning process (sequence: photolithography, electrochemical anodization) (a) Ti foil was pretreated to remove surface contaminants; (b) electrochemical anodization was performed to grow TiO_2 nanotube; (c) photolithography including photoresist coating, soft bake, UV exposure, post-exposure bake and development was carried out to pattern TiO_2nanotube; (d)wet etching was used to dissolve TiO_2 nanotube in selective area; (e) photoresist was stripped off, resulting in micropatterned TiO_2 nanotube.

(2) Micropatterned TiO_2 nanotube obtained at high voltages (> 25V)

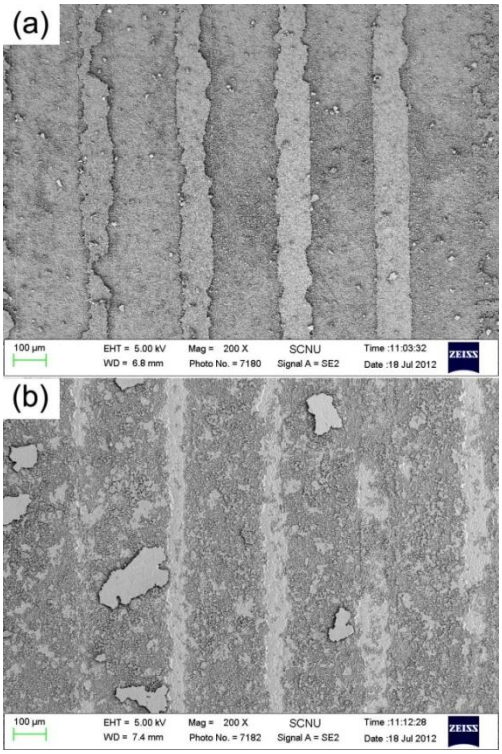

Figure S2. SEM images of micropatterned TiO_2 nanotube obtained via electrochemical anodization at constant voltages (a) 30V;(b) 40V

(3) Measurements of BSA adsorption peak and calibration curve

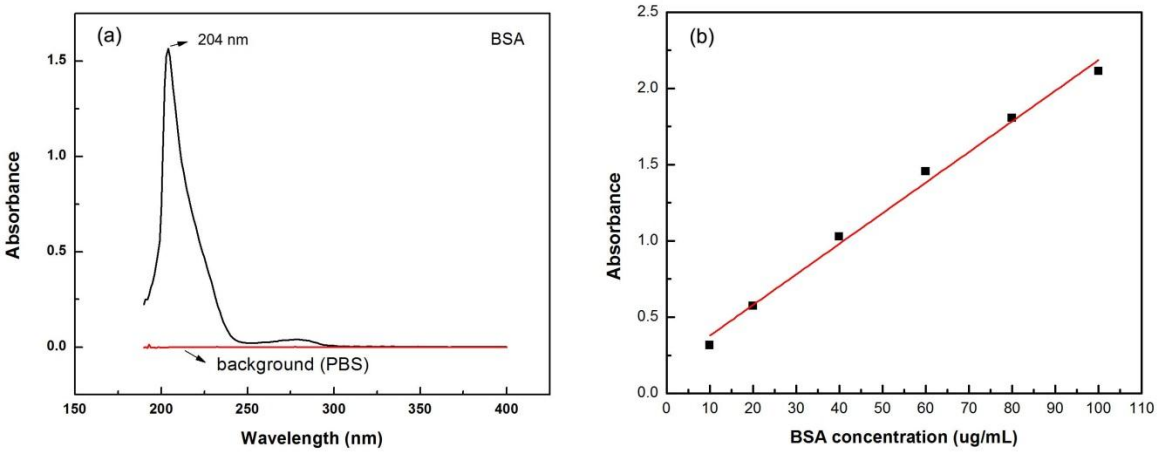

Figure S3. (a) BSA adsorption peak in UV-Vis measurements; (b) BSA calibration curve using 204nm as adsorption peak

(4) Data of human IgG adsorption onto micropatterned TiO_2 nanotube: The maximum saturated IgG adsorption capacity on TiO_2 nanotube and Ti are 29.17 and 4.47 $\mu g/cm^2$, respectively.

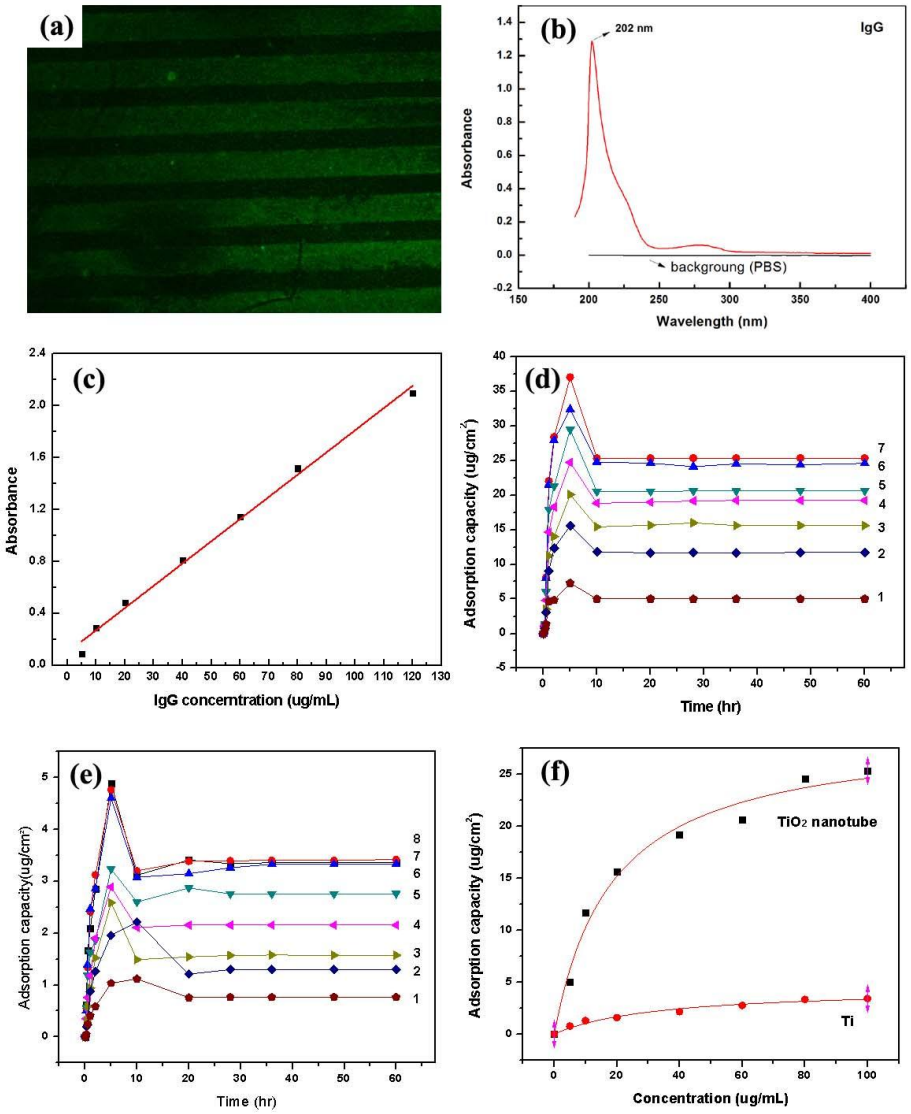

Figure S4. Human IgG adsorption behavior on micropatterned TiO_2 nanotube: (a) fluorescence image of microgrooved TiO_2 nanotube after adsorption of IgG-Cy3; (b) IgG adsorption peak (202nm) in UV-Vis measurement; (c) IgG calibration curve in the concentration range of 5-120 ug/mL; (d) IgG adsorption capacity on TiO_2 nanotube surface as a function of time at various concentrations; (e) IgG adsorption capacity on Ti surface as a function of time at various concentrations. 1-8 correspond to 5, 10, 20, 40, 60, 80, 100, 120 ug/ml, respectively; (f) saturated IgG adsorption capacity as a function of BSA concentrations. Measurements were carried out in PBS

solution (pH = 7.4).

(5) Contact angle measurements: the contact angles of Ti and TiO_2 nanotube were measured as 109.7 and 86.5^{o}C, respectively.

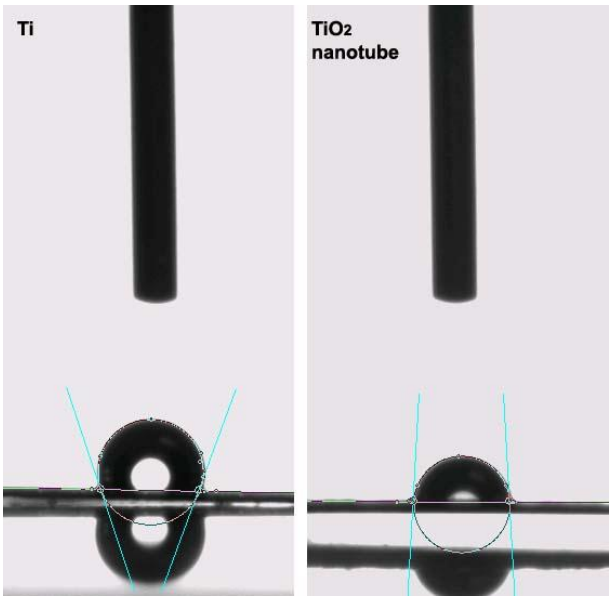

Figure S5. Contact angle of TiO_2 nanotube and Ti surface using PBS solution.

(6) Cell spreading behavior on micropatterned TiO_2 nanotube surface under different conditions

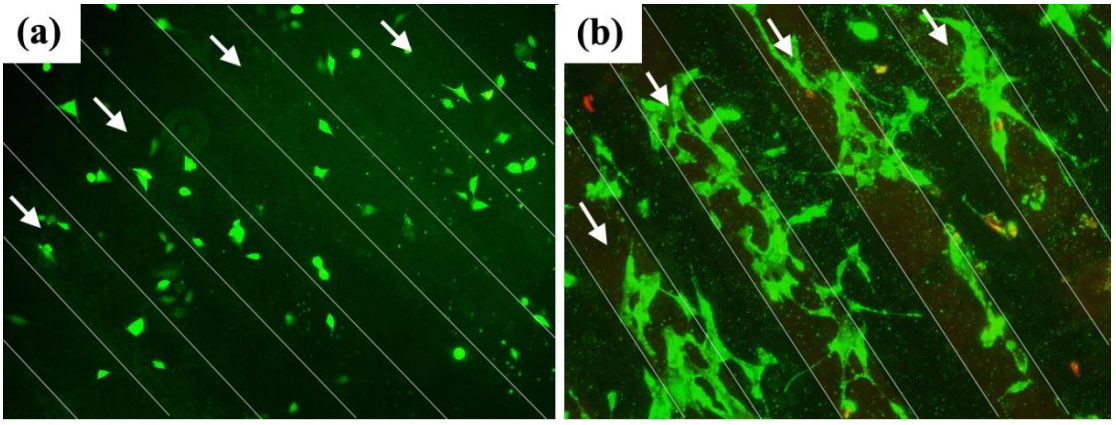

Figure S6. Cell spreading behaviors on micropatterned TiO_2 nanotube surface under different conditions: (a) cell culture for 3 days without pretreatment in blood plasma;

(b) cell culture for 3 days after pretreatment in blood plasma overnight. White arrows indicate the position and direction of microgrooved TiO_2 nanotube.

(7) Cell proliferation behavior on micropatterned TiO_2 nanotube surface

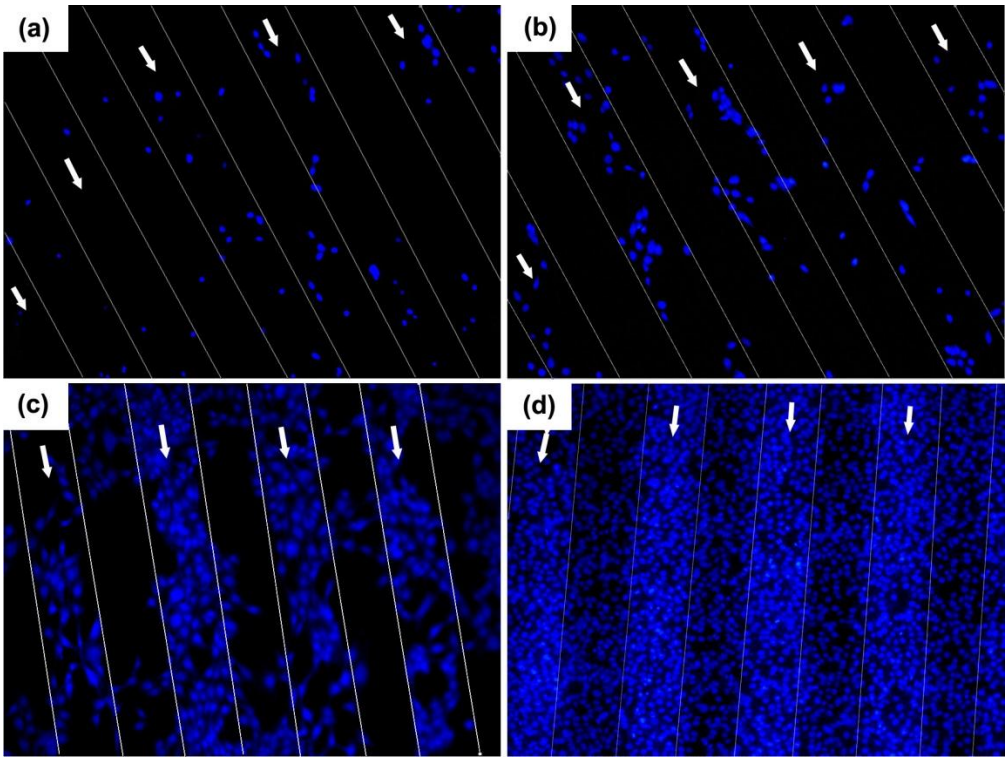

Figure S7. Fluorescence images (nuclei staining) of C2C12 cells cultured on microgrooved TiO_2 nanotube surface for different time: (a) 1 day; (b) 3 days; (c) 5 days; (d) 7days. All samples were pretreated in blood plasma overnight. White arrows indicate the position and direction of microgrooved TiO_2 nanotube.