Supplementary data

A facile approach for carburization of anodically grown titania nanotubes: towards metallization of nanotubes

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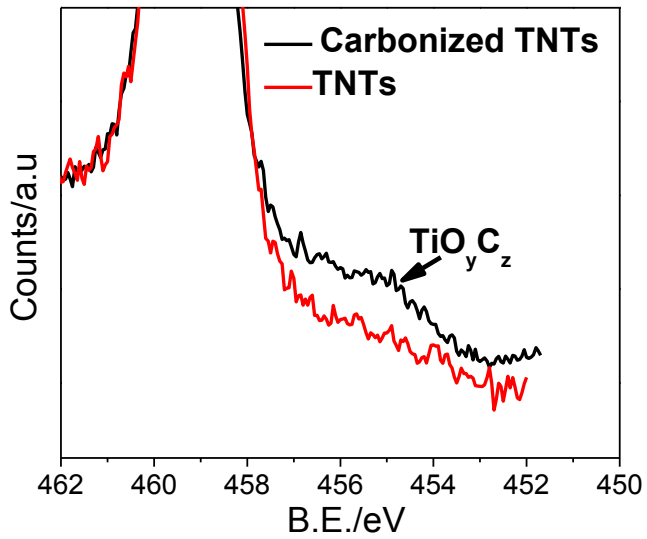

Fig. S1: Zoomed (zoomed of Fig. 3b) Ti 2p XPS spectra of TiO_2 nanotubes (TNTs) sample before and after carburization at 650 °C for 6h.

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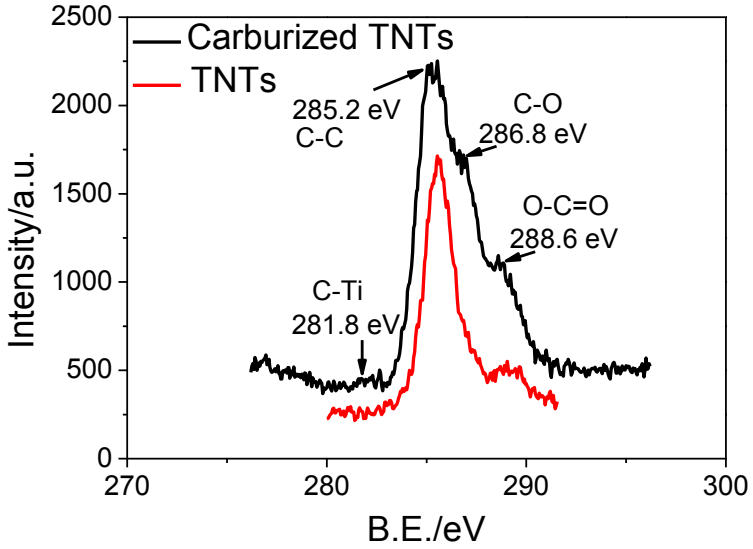

Fig. S2: C1S XPS spectrum of TiO_2 nanotubes before and after carburization at 650 °C for 6h.

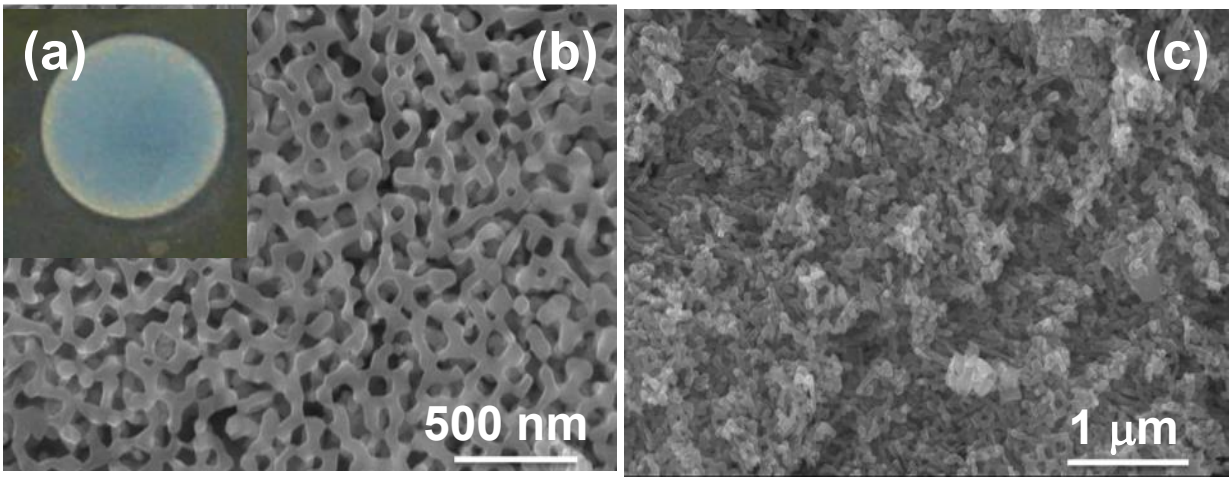

Fig. S3: (a) photo of TiO_2 nanotubes sample annealed at 650 °C for 6h inside the autogenic pressure reactor (Fig. 1a) without filling argon gas. SEM top (b) and cross-sectional (c) views of the same sample showing the collapsing of the nanotubes.

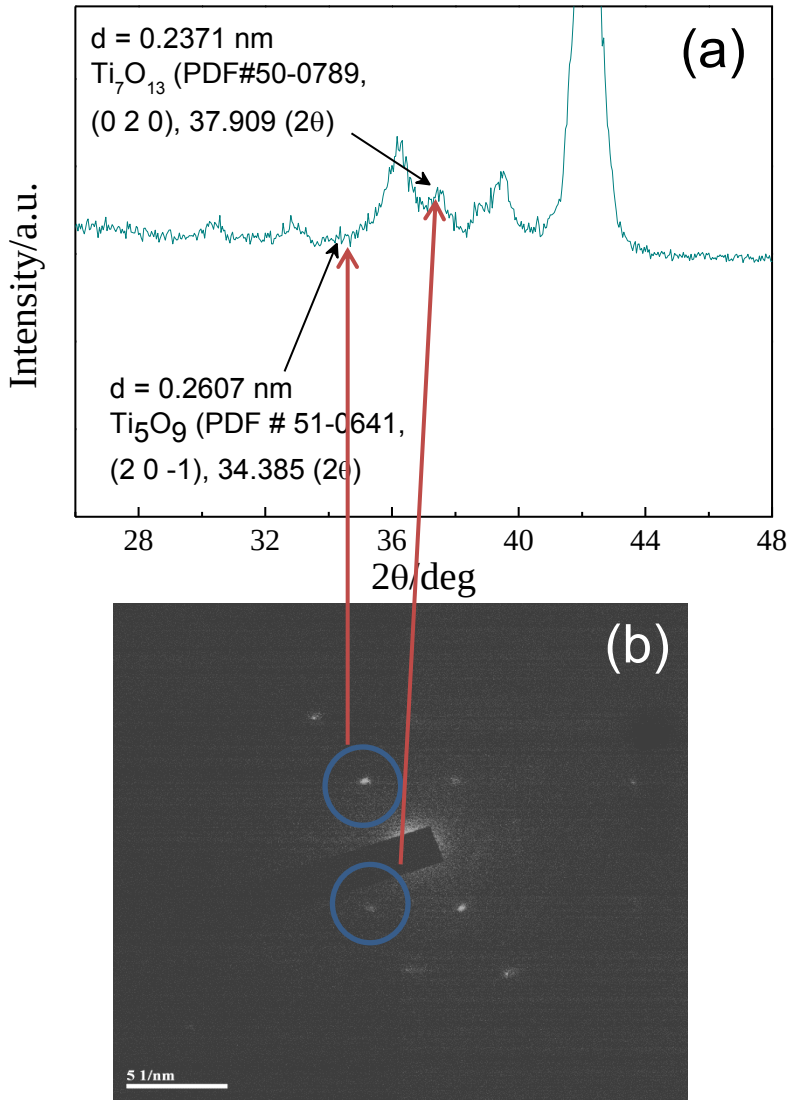

Fig. S4: XRD patterns (a) and SAED patterns of the carburized (650 °C, 6h) TiO_2 nanotube showing the presence of reduced oxides of Ti, e.g., Ti_5O_9 or Ti_7O_{13}.

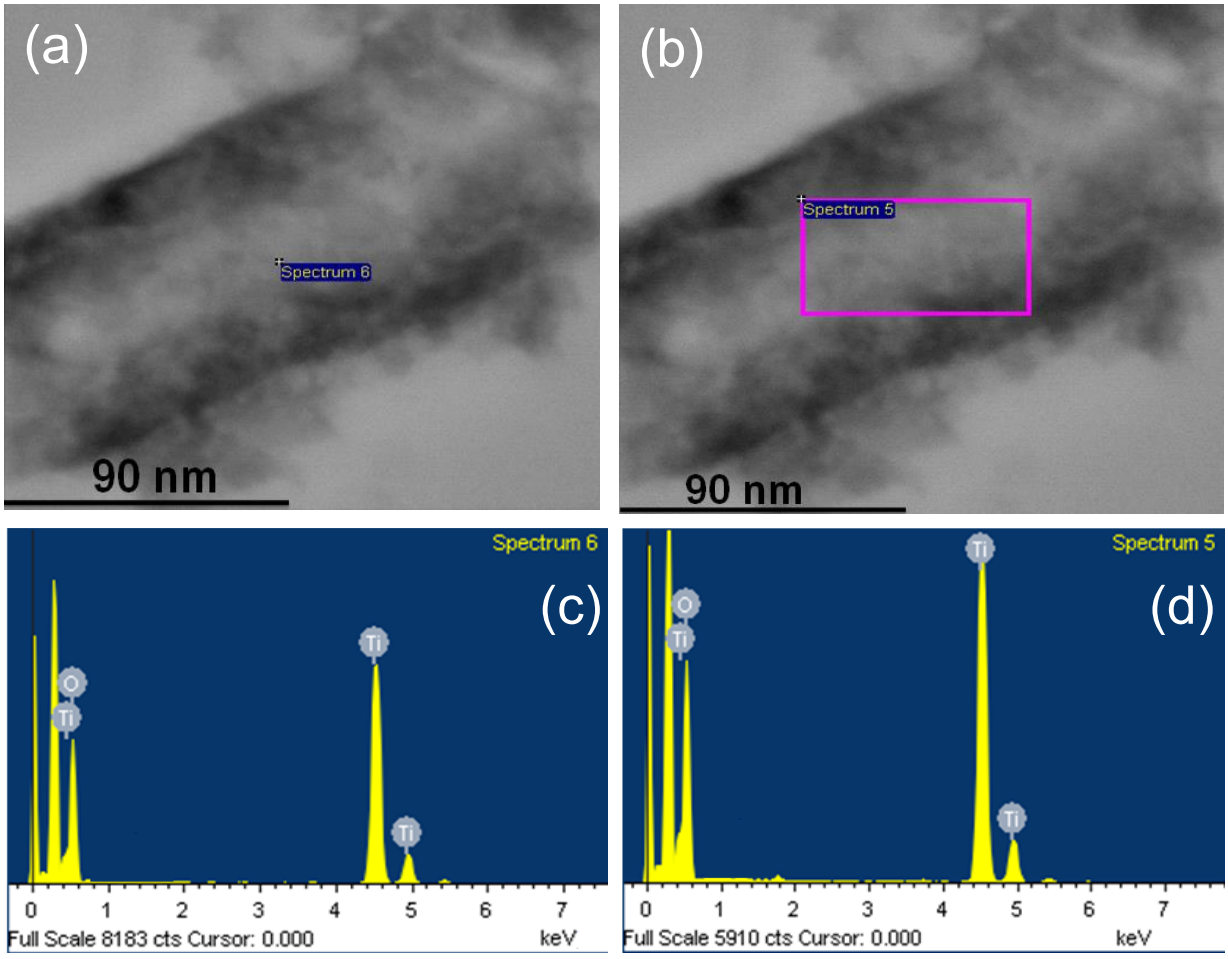

Fig. S5: TEM view of a single carburized TiO_2 nanotube (a, b) and the EDX spectra of the same nanotubes (c, d).

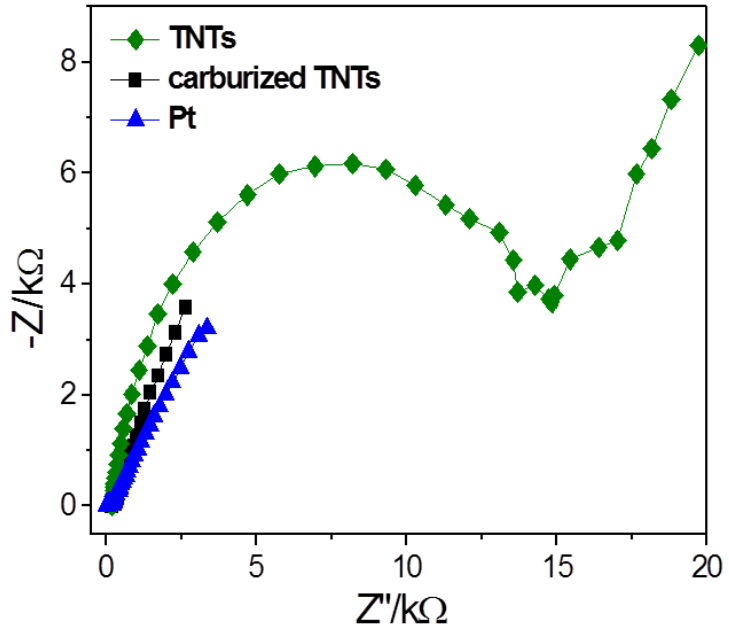

Fig. S6: EIS Nyquist plot of TiO_2 nanotube (TNTs), carburized (650 °C, 6h) TNTs, and Pt electrodes in a solution of 5 mM $K_4[Fe(CN)_6]$ in 0.1 M KNO_3 at peak current potential of CV, i.e., 0.38 V vs AgCl, frequency range: 10^6 Hz–10^{-2} Hz.

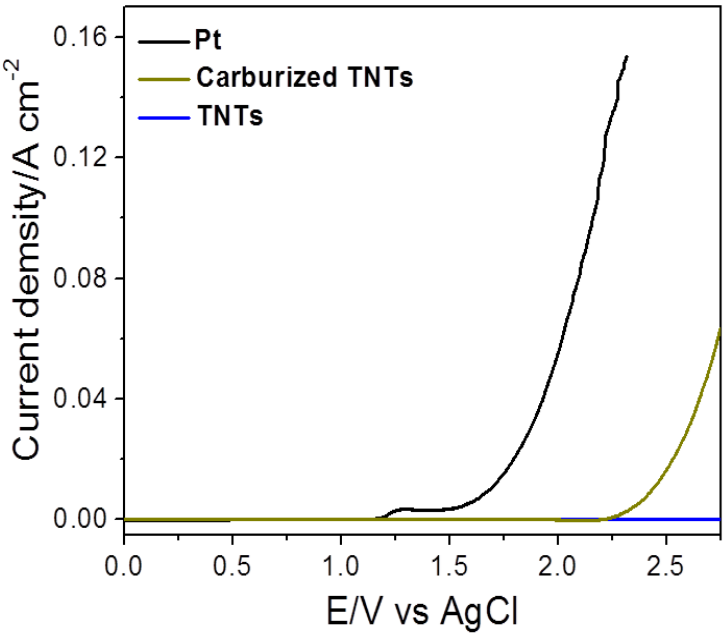

Fig. 7: Polarization curves of the Pt, carburized TNTs, and TNTs electrodes in 1M H_2SO_4 exhibiting different overpotentials for O_2 evolution.