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## K-doped mixed-phase 1D TiO<sub>2</sub> nanofibers on Ti foil for electrochemical supercapacitor: Annealing-free synthesis

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This study demonstrated the annealing-free synthesis of K-doped mixed-phase TiO<sub>2</sub> (anatase and rutile, AR) nanofibers (K-TNF) on Ti foil at 150°C assisted by KOH(aq.) for electrochemical supercapacitors (ESCs) applications. The aggregated network and the average diameter of K-TNF have slightly decreased with the increase of KOH(aq.) concentrations from 1 to 3 M, while the amount of K-doping, Ti<sub>3+</sub> interstitials, and -OH functional groups was substantially increased. The TiO<sub>2</sub> phase was entirely mixed of rutile and anatase, AR phase. All the K-TNF modified Ti electrodes (K-TNF/Ti) exhibited quasi-rectangular shaped cyclic voltammograms (CVs) in a wide potential range and the specific capacitance (Cs) for the optimal electrode with mixed AR phase TiO<sub>2</sub> was ca. 70.30~95.18 mF/cm<sup>2</sup>, obtained from the CV (scan rate, 5mV/s) and charge-discharge (CD, current density, 50μA/cm<sup>2</sup>) measurements, respectively. The higher Cs for the optimal K-TNF/Ti electrode can be ascribed to the synergistic effect of mixed AR phase, a high percentage of K-doping (ca.20.20%), and Ti<sup>3+</sup> interstitials (ca.18.20 %), respectively. The directional electron transport through the 1D channel as well as the -OH functional groups on the K-TNF surface is also contribute to enhancing Cs. The K-TNF/Ti electrode discovered excellent stability with the Cs retention of ca. 95% and a very small change of internal series resistance (Rs) and charge transfer resistance (Rct) at the electrode/electrolyte interface after 3000-CD cycles.

### Biography

Prof Hasi Rani Barai is the assistant professor in the School of Mechanical and IT Engineering, Yeungnam University, Gyeongsan, Korea, from 2015. She worked as a postdoctoral research fellow in the dept. of Chemistry and Nanoscience, Ewha Woman's University, Seoul, Korea. She worked as a postdoctoral research fellow in KCAP(Korea center for artificial photosynthesis) in dept. of Chemistry, Sogang University, Seoul, Korea. She received her PhD in the dept. of Chemistry, Inha University, Korea, Master of Science (Physical organic chemistry) and BSc in Chemistry in Dhaka University, Bangladesh. She published about 41 scientific journals. She did several invited speaker/oral/poster presentations at national/international conferences. Research interest in nanotechnology, nanomaterials, materials preprocess, energy storage devices, electrochemistry, and supercapacitors.

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