Supplementary information:

High temperature operation of electrochemically-gated SnO_2 nanowire field-effect transistors

Babak Nasr[a,b], Zhirong Zhao-Karger[a], Di Wang[a], Robert Kruk[a], Horst Hahn[a,b,c], Subho Dasgupta[a,*]

[a]Institute for Nanotechnology, Karlsruhe Institute of Technology (KIT), D-76344 Eggenstein-Leopoldshafen, Germany, Fax: +49 721-608-26368 Tel: +49 721-608-23109 Email: subho.dasgupta@kit.edu

[b]KIT-TUD Joint Research Laboratory Nanomaterials, Technische Universität Darmstadt (TUD), Institute of Materials Science, Petersenstr. 32, D-64287 Darmstadt, Germany

[c]Center for Functional Nanostructures (CFN), Karlsruhe Institute of Technology (KIT), Wolfgang-Gaede-Str. 1a, 76131 Karlsruhe, Germany

Contents:

(A) High resolution transmission electron micrograph (HRTEM) and its fourier transform (FFT) showing the crystallographic growth direction of SnO_2 nanowires

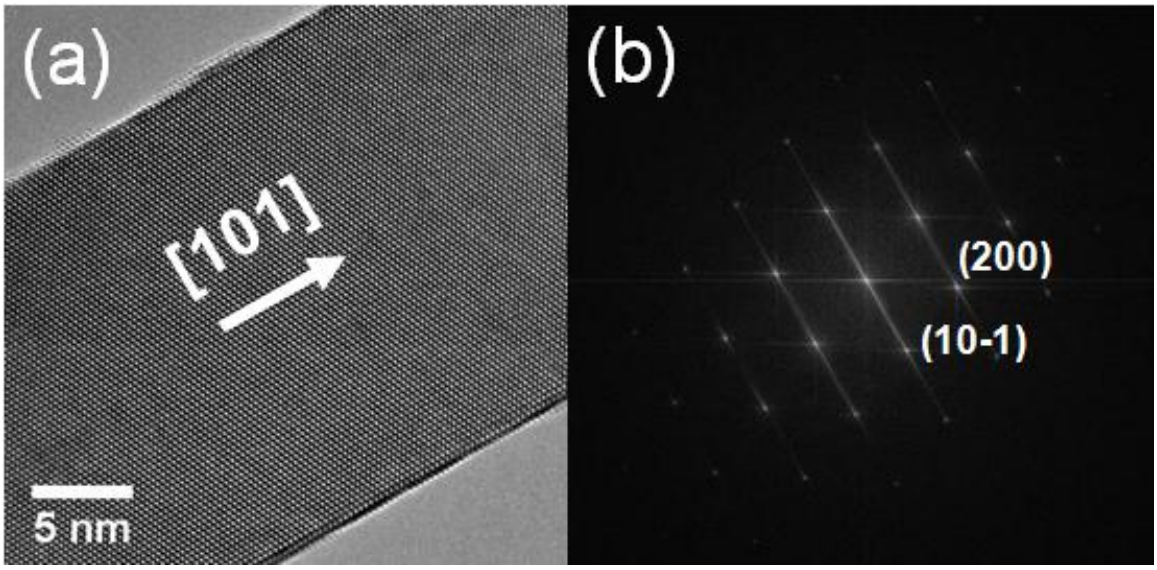

Figure S1 (a) High resolution TEM of a single SnO_2 nanowire (b) FFT of the HRTEM image which is shown in the left, in Figure S1(a).

(B) Scanning electron microscopy (prior to electrolyte printing) and high resolution optical image (after electrolyte printing) showing top view of a typical electrochemically-gated nanowire channel device, and a complete set of nanowire devices, respectively

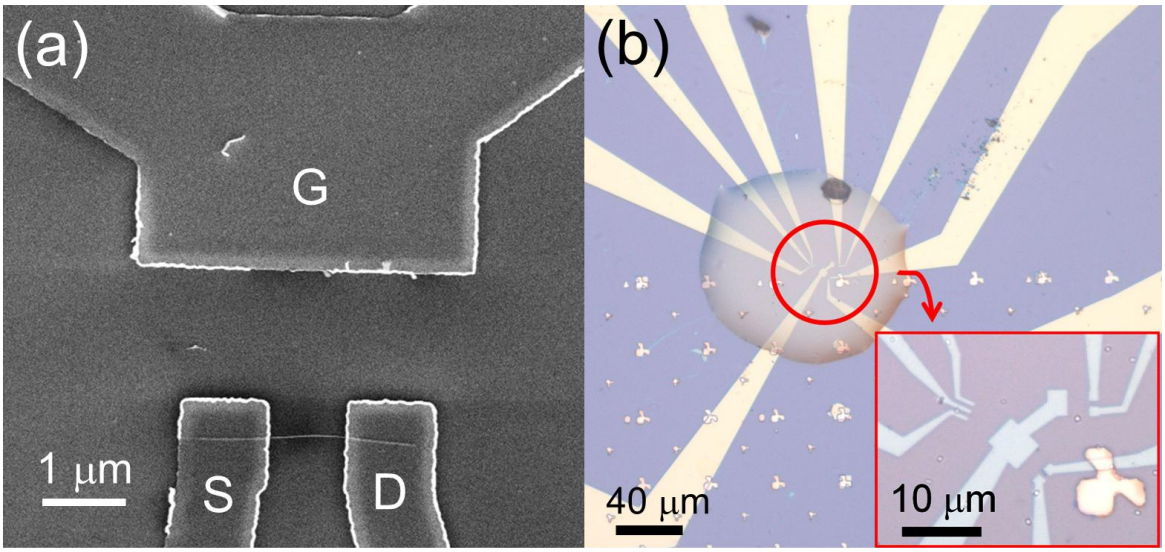

Fig. S2(a) SEM image showing top view of a typical nanowire channel electrochemically-gated device with a single nanowire bridging the source and drain electrode; (b) High resolution optical image of a set of nanowire devices after printing of the composite solid polymer electrolyte.

(C) Complete dataset of temperature dependent transfer curves measured for single SnO_2 nanowire EG FETs

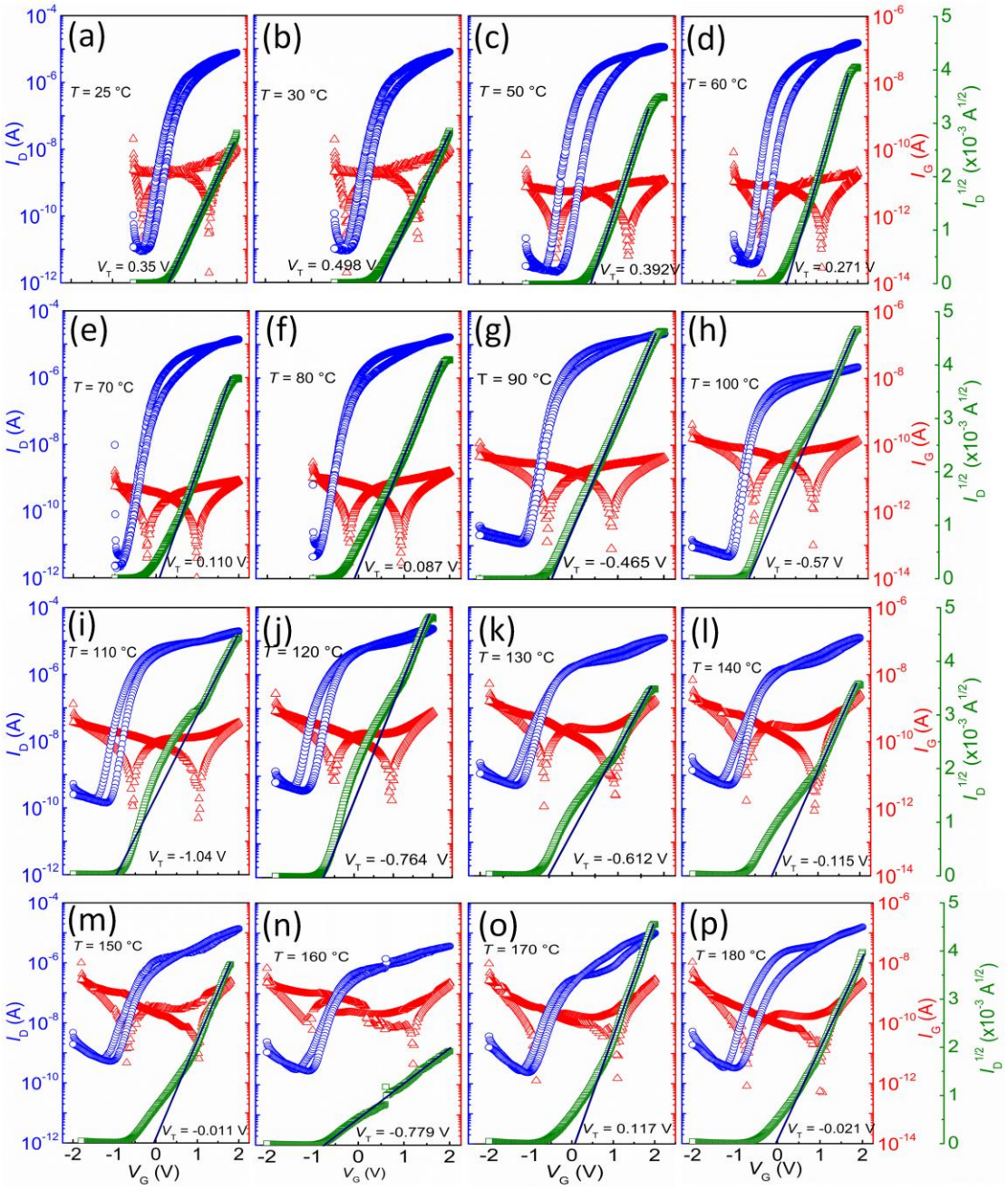

Figure S3(a) Transfer characteristics of a single SnO_2 nanowire EG FET device, the applied drain voltage is V_D= 0.5 V, the blue circles, the green squares and the red triangles represent the drain current, the square root of the drain current and the gate current, respectively. Figures (a-p) show the gradual change in the performance parameters (V_T, I_G, $I_{On\text{-}sat}$ and *On*/*Off*) of the device with the increase in operating temperatures from 25 °C to 180 °C at 10 °C steps.

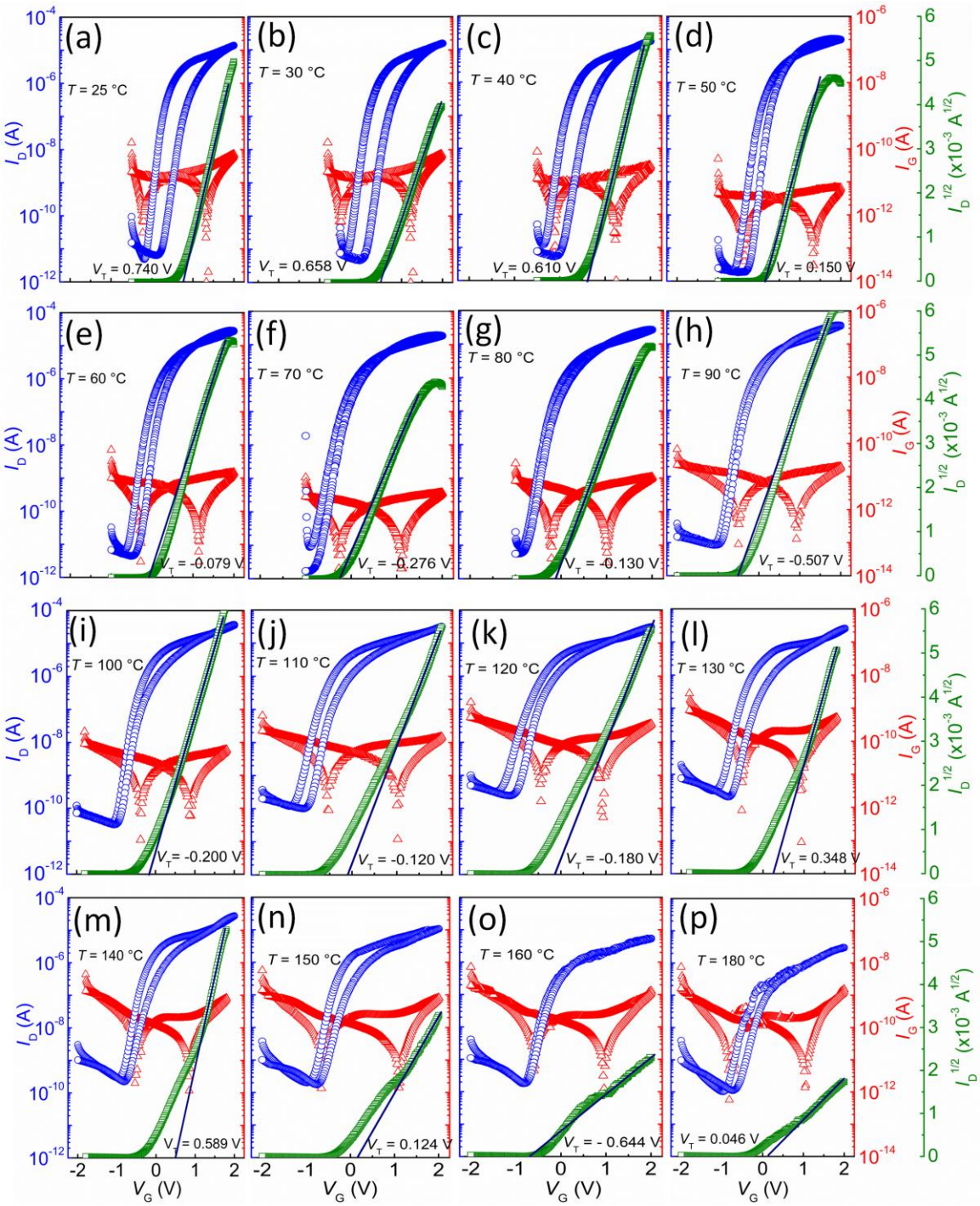

Figure S3(b) Similar temperature dependent transfer curves measured for another identical single SnO_2 nanowire EG FET device showing reproducibility of the measured phenomena.