**SUPPORTING INFORMATION AVAILABLE**

**Figure S1.** Scanning electron micrographs of VO$_2$ nanostars prepared by hydrothermal treatment of bulk VO$_2$ and VO using methanol as a structure-directing agent at different reaction times. A distinct alteration of the morphology is observed with increasing reaction time with degradation of the intricate six-fold symmetry of the nanostructures; remnant “arms” of the nanostars are detected within a matrix of poorly defined VO$_x$ nanostructures.

**Figure S2.** Raman spectra of the vapor-transported V$_2$O$_5$ thin films and nanostars obtained by subsequent hydrothermal treatment of the thin films. All major V-O-V and V=O vibrational modes are marked; the peaks not explicitly assigned correspond to Fe$_2$O$_3$ and other iron oxide species, as also observed by X-ray diffraction.

**Figure S3.** Raman spectra of the as-prepared VO$_2$ nanostructures. All major vibrational peaks obtained here are matched with bulk VO$_2$ Raman modes.