Supplementary Information

Solvothermal Synthesis of VO_2 Nanoparticles with Locally Patched V_2O_5 Surface Layer and their Morphology-Dependent Catalytic Properties for the Oxidation of Alcohols

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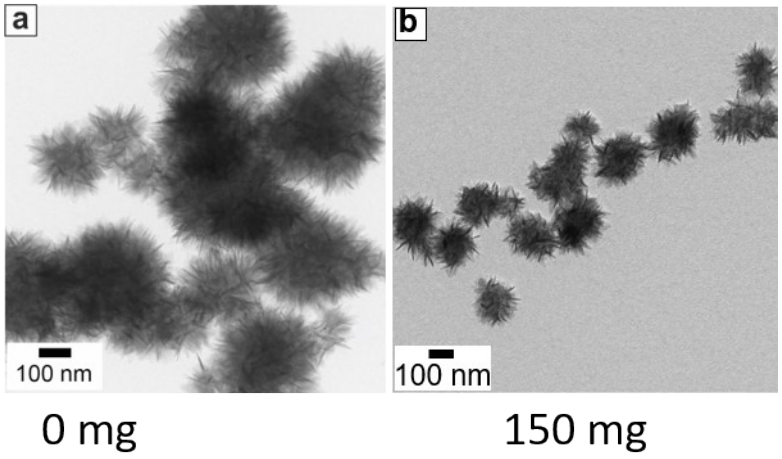

Figure S1. Transmission electron microscopy images showing the influence of amount of surfactant F-127 on the morphology of VO_x nanourchins synthesized without F-127, (a) and 150 mg of F-127(b)

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Analysis of Oxidation Catalysis

To determine the product selectivity, the liquid products were analysed by gas chromatography, Agilent 7890A (Agilent Technologies Inc., Santa Clara, CA, USA) equipped with a flame ionization detector (FID), split injection (1:100) and a 19019S001 HP-PONA column. Helium was used as the carrier gas. For benzyl alcohol oxidation the inlet and detector were kept at temperature of 210 °C and 250 °C, respectively. The oven was started at 50 °C and hold for a minute later increased up to 160 °C with a ramp rate of 5 °C/min. On the other hand, for furfuryl alcohol oxidation the inlet and detector were kept at temperature of 190 °C and 250 °C, respectively. The oven was started at 80 °C and hold for 2 minute later increased up to 170 °C with a temperature ramp rate of 10 °C/min.

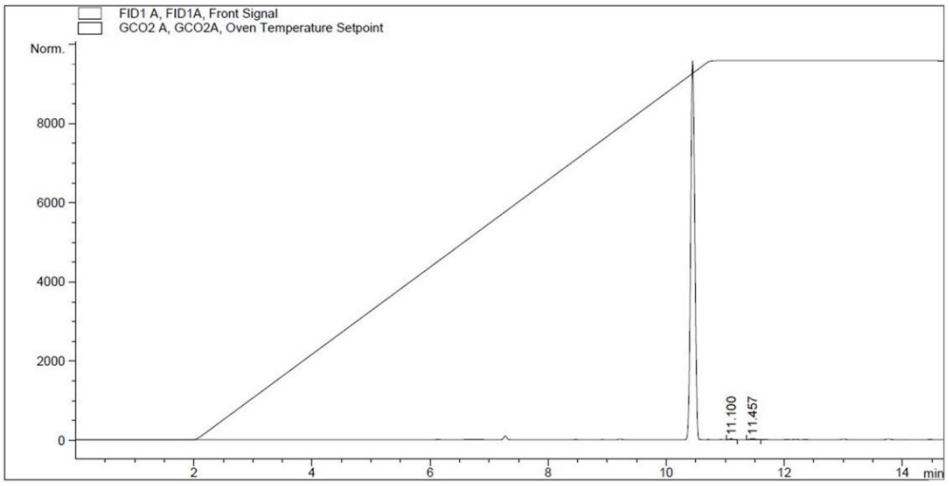

Figure S2. GC chromatogram of benzyl alcohol oxidation using VO_2 nano-urchins.

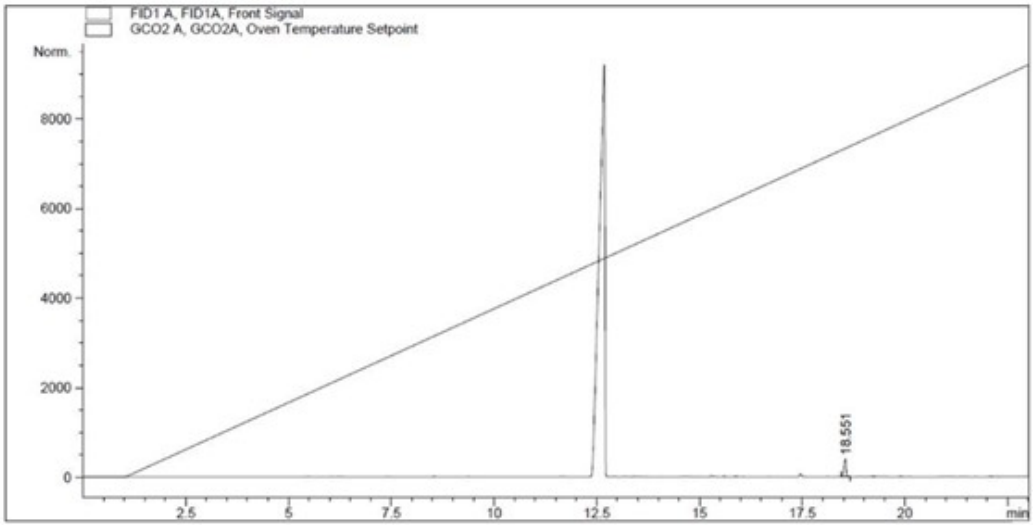

Figure S3. GC chromatogram of furfuryl alcohol oxidation using VO_2 nano-urchins.

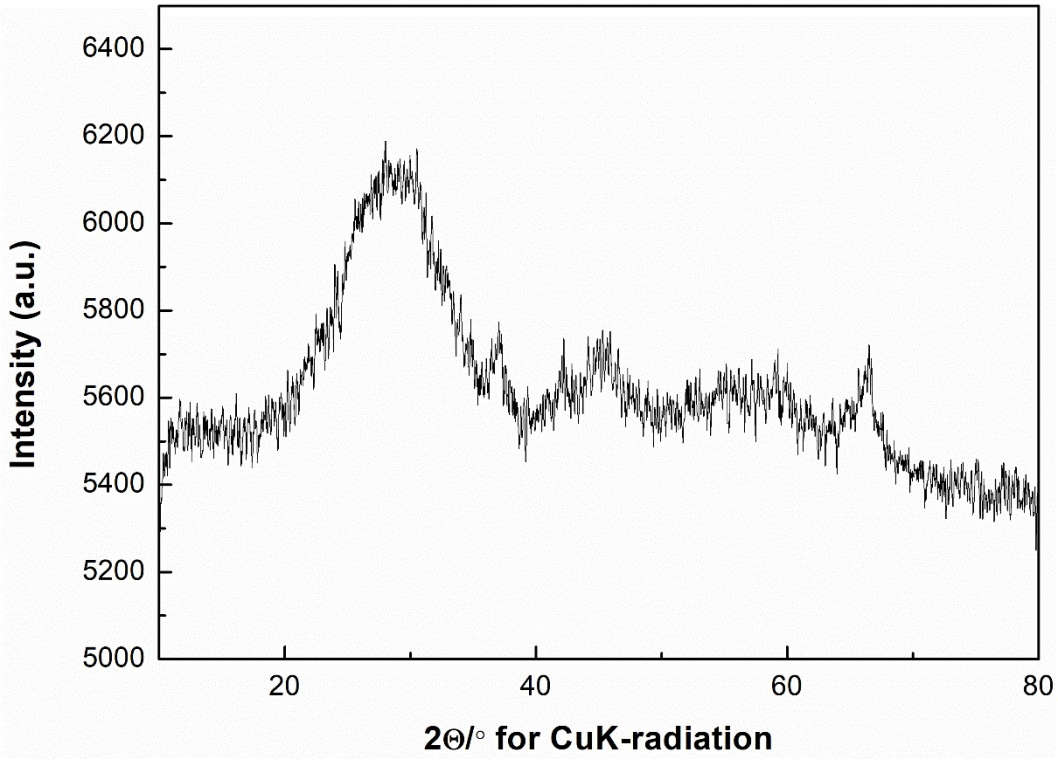

Figure S4. X-ray diffractogram of re-used VO_2 nano-urchin catalyst.

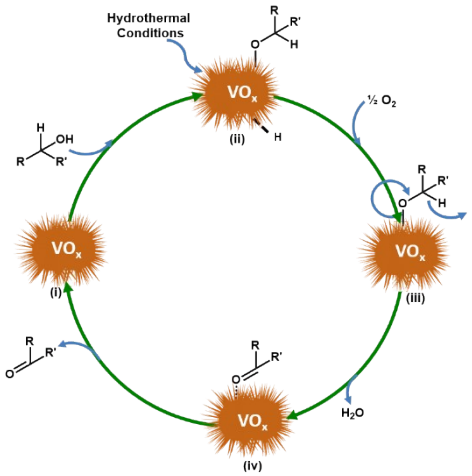

Figure S5. Proposed reaction mechanism for the oxidation of alcohols on VO_2 surfaces

Table S1. Comparison of the catalytic activity of the catalysts for the oxidation of alcohols.

Catalyst	Temperature (°C)	Time (hrs)	Conversion (%)	Reference
V_2O_5	rt	36	74	81
V_2O_5	82	5	30	82
V_2O_5@TiO_2	50	1	35	83
V_2O_5@GO	80	2	32	84
V_2O_5@$SrTiO_3$	80	6	94	85
V_2O_5@C_3N_4	rt	42	64	86
VO_2/nano-urchin	150	4	100	Our catalyst