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Electronic supplementary information

Nanofibrous vanadium-doped rutile titania derived from cellulose substance by flame synthesis

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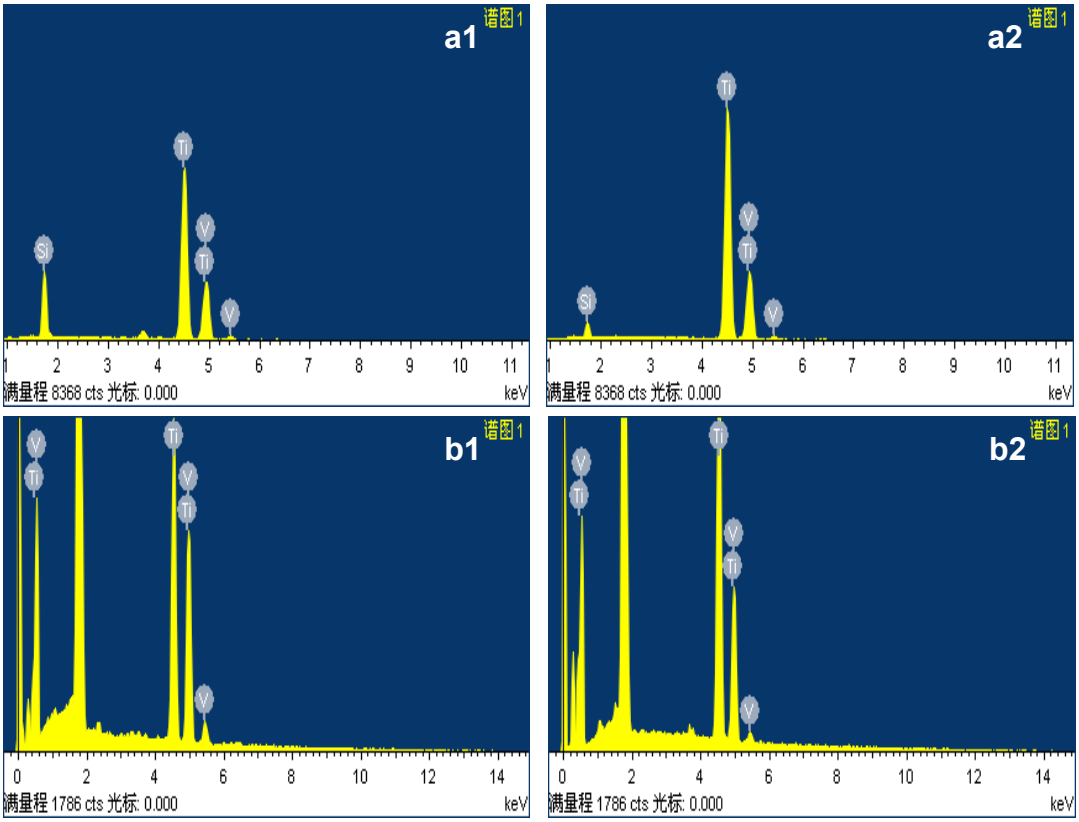

Fig. S1 EDX spectra of the V-doped rutile titania nanofibrous materials obtained by flame burning of the as-deposited (titania/vanadia)$_n$/filter paper composite sheets: a1) the as-obtained sample V_2O_5/TiO_2-F-1; a2) V_2O_5/TiO_2-F-1 after being treated with 1 M HCl; b1) the as-obtained sample V_2O_5/TiO_2-F-2; b2) V_2O_5/TiO_2-F-2 after being treated with 1 M HCl. All of the analyses were carried out without any conductive metal coating of the samples, and Si element originated from the silicon wafer employed to support the samples in the electron microscopy observations.

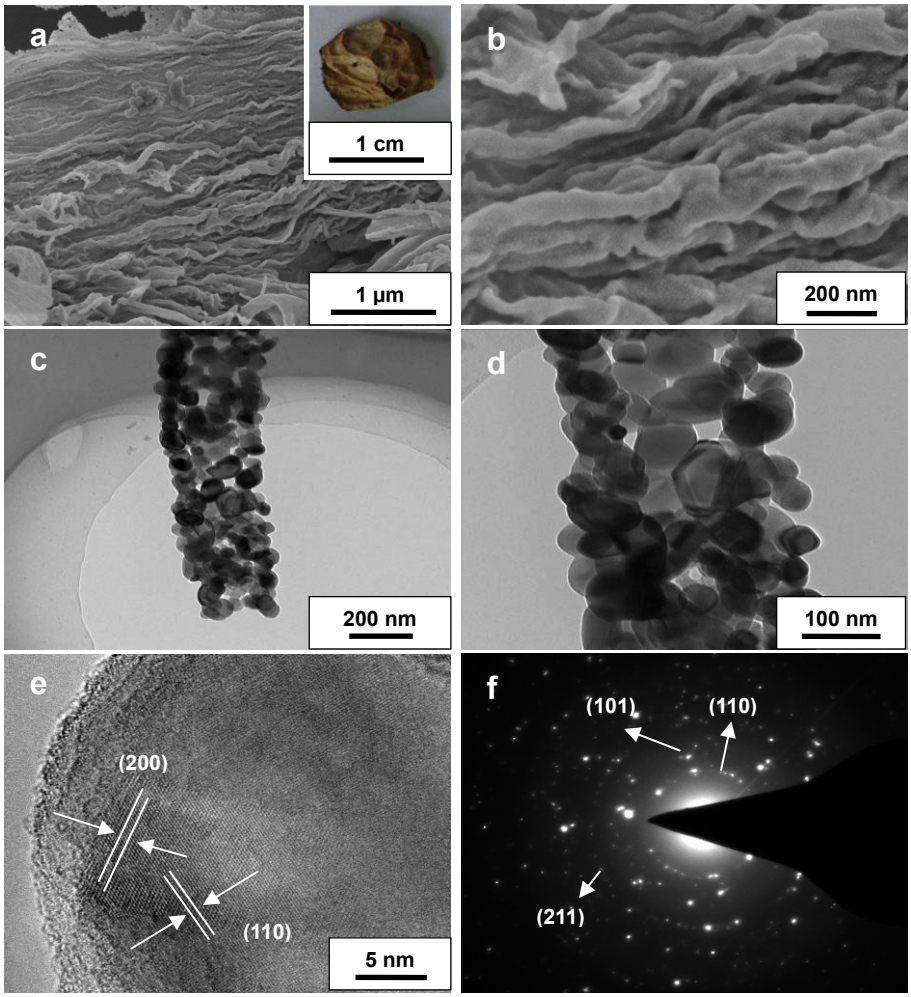

Fig. S2 Electron micrographs and SAED pattern of the as-obtained sample V_2O_5/TiO_2-F-3. a) FE-SEM overview image of the sample, inset is the photograph of the material; b) close-up FE-SEM image of the sample; c) TEM image of a single V-doped rutile titania nanofibre; d) close-up TEM image of the V-doped rutile titania nanofibre; e) HR-TEM image of the V-doped rutile nanocrystallites; f) SAED pattern of the V-doped rutile nanocrystallites.

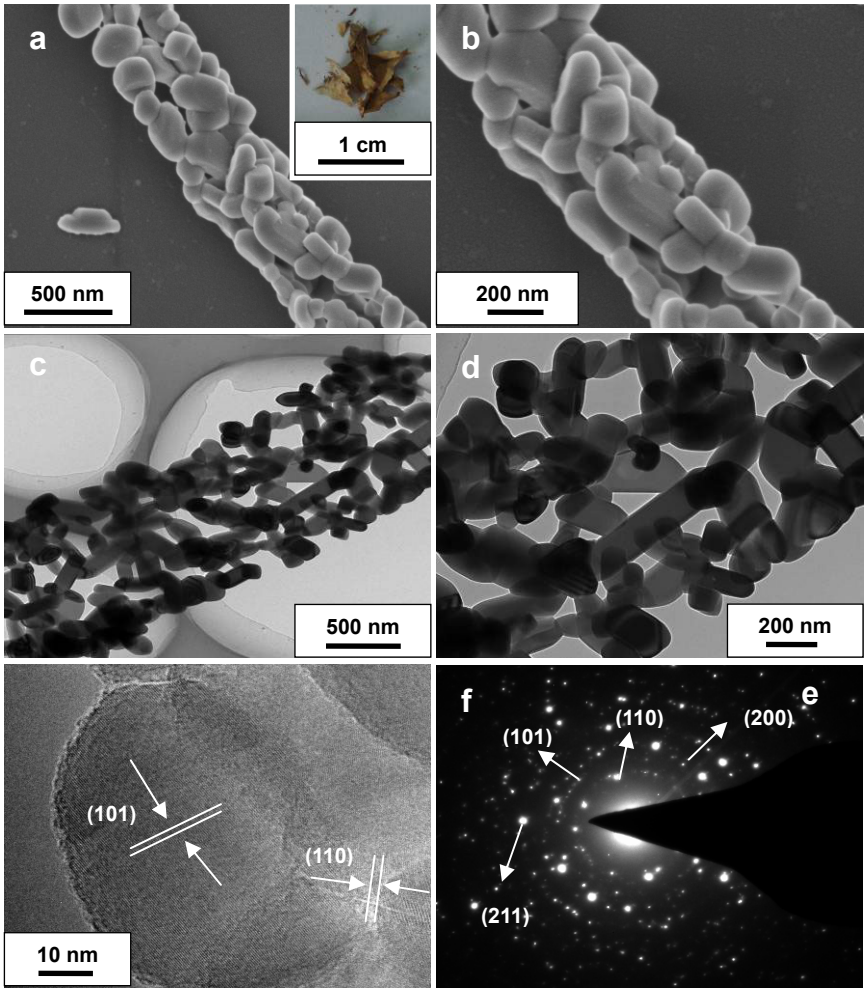

Fig. S3 Electron micrographs and SAED pattern of the as-obtained sample V_2O_5/TiO_2-F-4. a) FE-SEM overview image of the sample, inset is the photograph of the material; b) close-up FE-SEM image of the sample; c) TEM image of a single V-doped rutile titania nanofibre; d) close-up TEM image of the V-doped rutile titania nanofibre; e) HR-TEM image of the V-doped rutile nanocrystallites; f) SAED pattern of the V-doped rutile nanocrystallites.

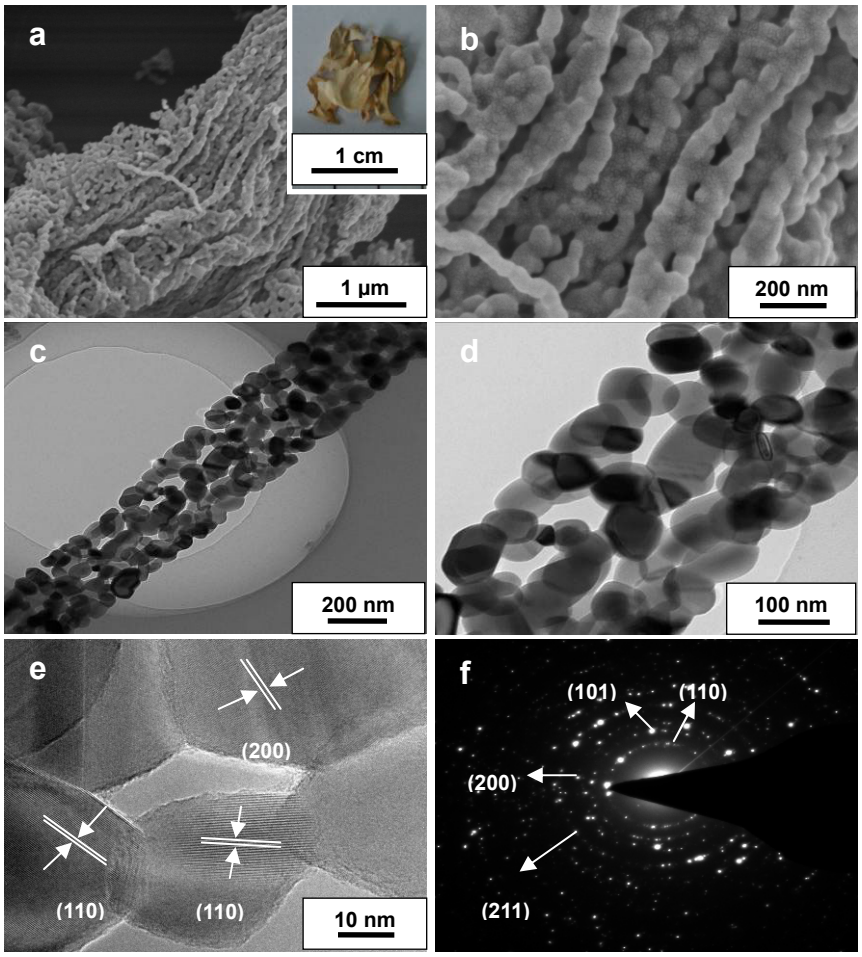

Fig. S4 Electron micrographs and SAED pattern of the as-obtained sample V_2O_5/TiO_2-F-5. a) FE-SEM overview image of the sample, inset is the photograph of the material; b) close-up FE-SEM image of the sample; c) TEM image of a single V-doped rutile titania nanofibre; d) close-up TEM image of the V-doped rutile titania nanofibre; e) HR-TEM image of the V-doped rutile nanocrystallites; f) SAED pattern of the V-doped rutile nanocrystallites.

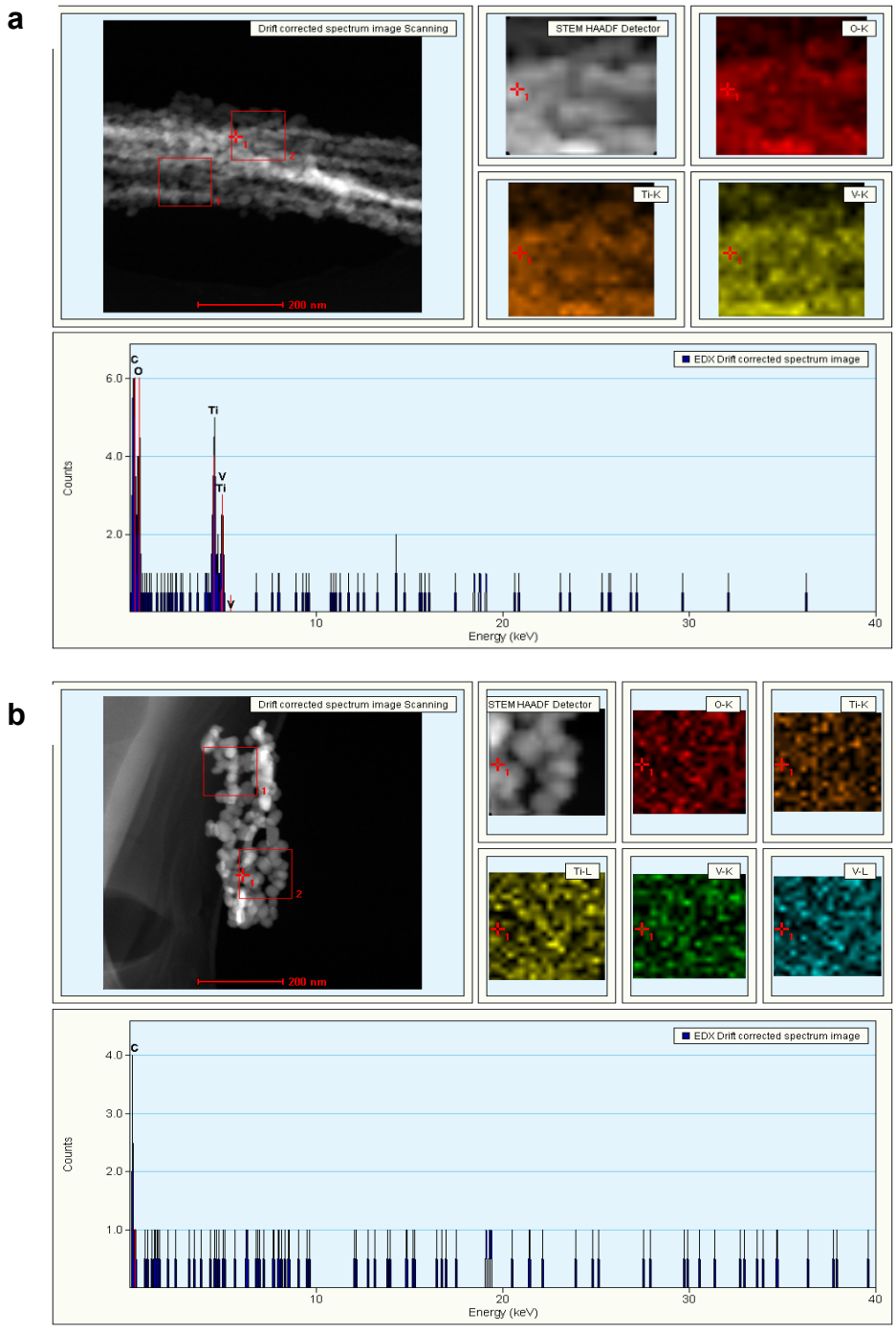

Fig. S5 EDX mapping of Ti, V and O of a) the sample V_2O_5/TiO_2-F-1 after being treated with 1 M HCl and b) the sample V_2O_5/TiO_2-F-2 after being treated with 1 M HCl.

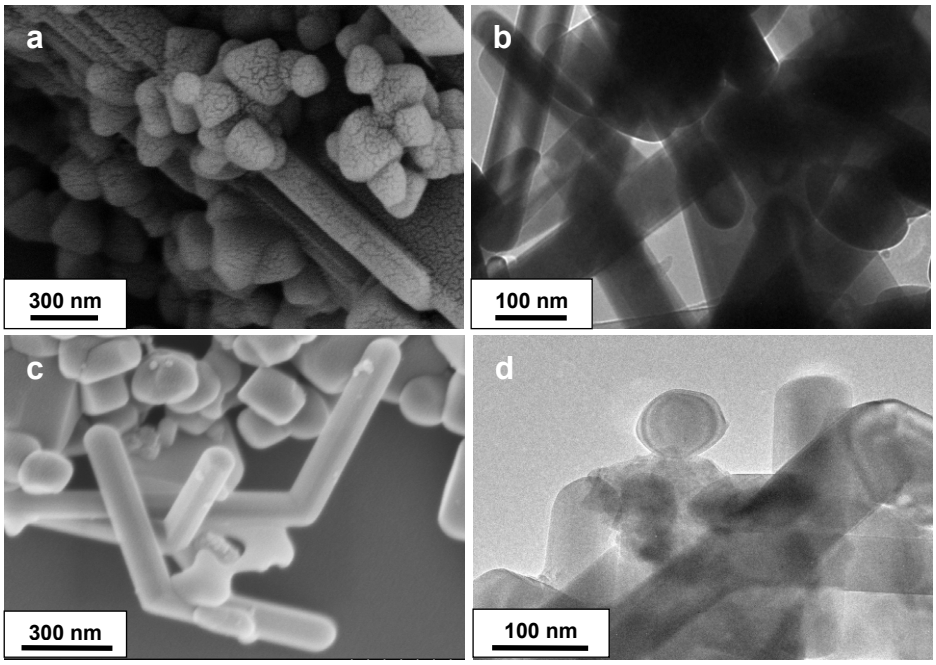

Fig. S6 (a, b) Electron micrographs of the as-obtained sample V_2O_5/TiO_2-C-1: a) FE-SEM image of the sample; b) TEM image of the sample. (c, d) Electron micrographs of the sample V_2O_5/TiO_2-C-1 after being treated with 1 M HCl: c) FE-SEM image of the sample; d) TEM image of the sample.

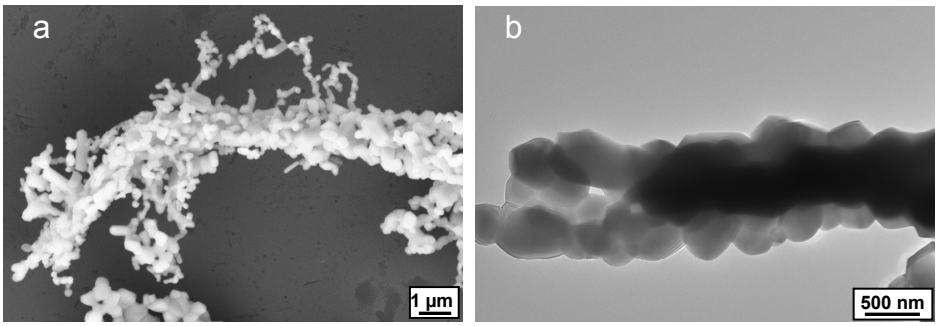

Fig. S7 Electron micrographs of the rutile titania materials fabricated by calcination of the as-prepared $(titania)_{20}$/filter paper composite sheet at 1000 °C for 2 h. a) FE-SEM image of the sample; b) TEM image of the sample.

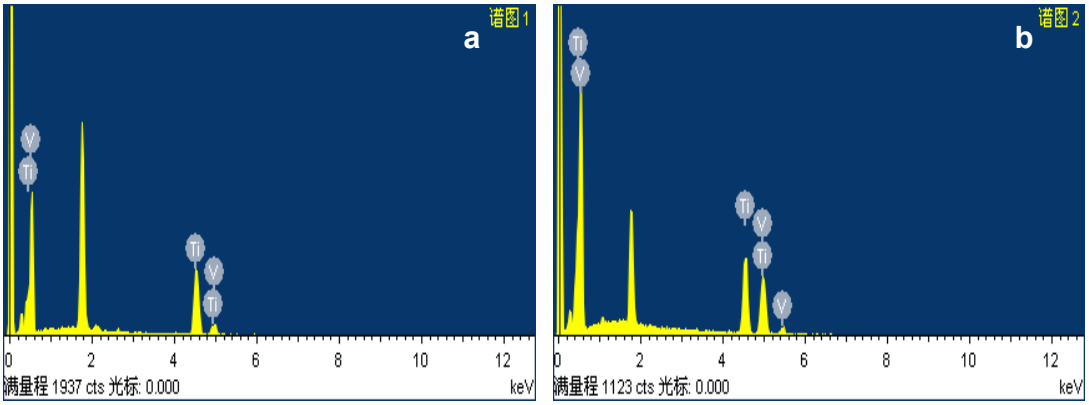

Fig. S8 EDX spectra of the V-doped rutile titania materials obtained by calcination of the as-deposited (titania/vanadia)$_{10}$/filter paper composite sheet at 600 ºC in air: a) the as-obtained sample V_2O_5/TiO_2-C-1; b) V_2O_5/TiO_2-C-1 after being treated with 1 M HCl. All of the analyses were carried out without any conductive metal coating of the samples, and Si element originated from the silicon wafer employed to support the samples in the electron microscopy observations.

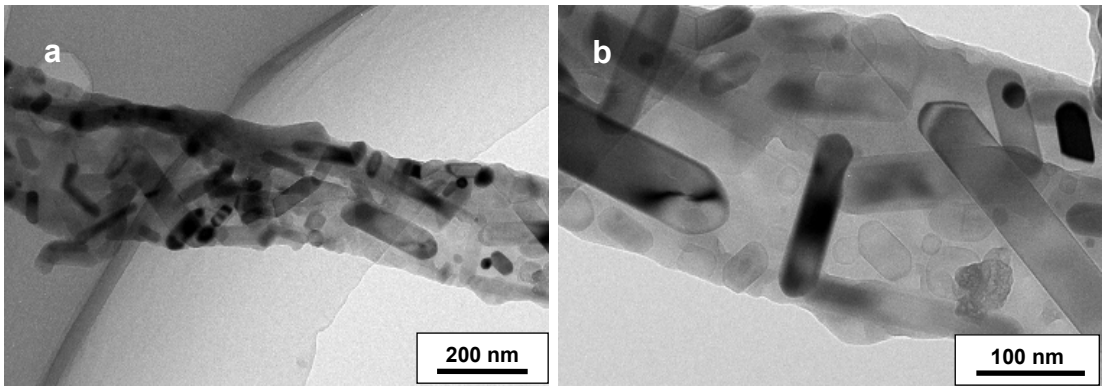

Fig. S9 TEM micrographs of the rutile titania/silica hybrid materials fabricated by calcination of the as-prepared (silica)$_3$/(titania/silica)$_5$/(silica)$_3$/filter paper composite sheet at 1000 ºC in air. a) TEM image of an isolated rutile titania/silica hybrid nanofibre; b) close-up TEM image of the rutile titania/silica hybrid nanofibre.

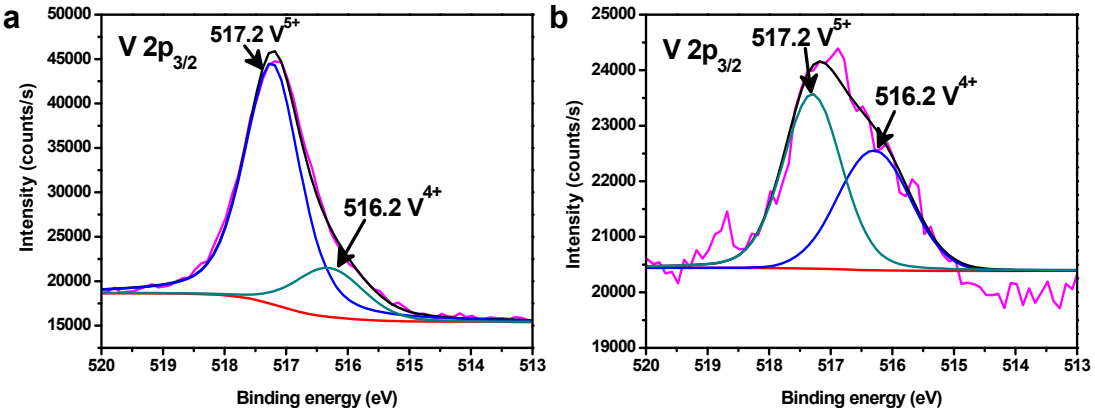

Fig. S10 XPS spectra (V $2p_{3/2}$ region) of the sample V_2O_5/TiO_2-C-1: (a) the as-obtained sample, (b) sample after being treated with 1 M HCl.