

## Reaction of vanadium phosphates with alcohols at elevated temperature and pressure

Wen-Sheng Dong,<sup>1</sup> Jonathan K. Bartley,<sup>1</sup> Nicholas F. Dummer<sup>1</sup> Frank Girgsdies,<sup>2</sup> Dansheng Su,<sup>2</sup> Robert Schlögl<sup>2</sup> Jean-Claude Volta<sup>3</sup> and Graham J. Hutchings,<sup>1\*</sup>

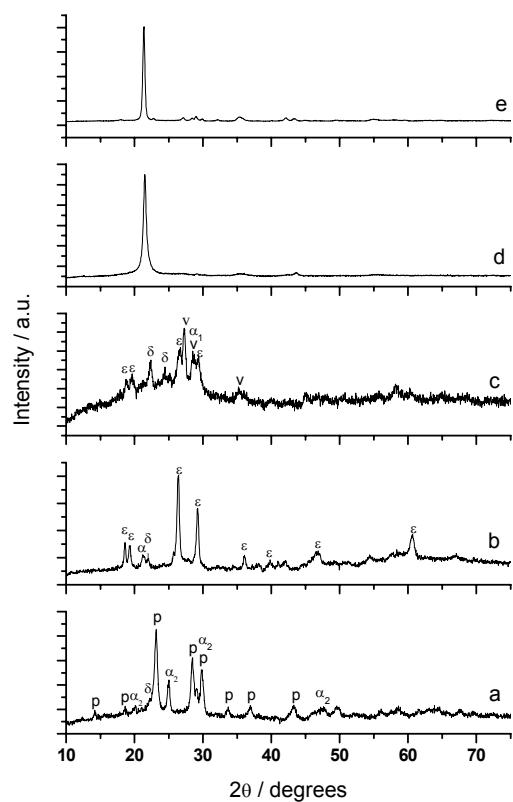
<sup>1</sup> School of Chemistry, Cardiff University, Main Building, Park Place, Cardiff, UK CF10 3AT

<sup>2</sup>Department of Inorganic Chemistry, Fritz-Haber-Institute der Max-Planck-Gesellschaft, D-14195, Berlin, Germany

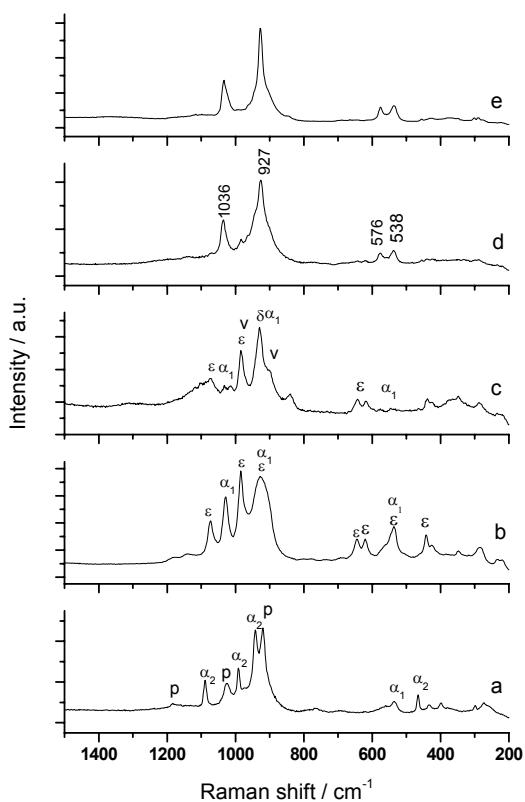
<sup>3</sup> Institute de Researches sur la Catalyse, CNRS, 2 Avenue Albert Einstein, 69626 Villeurbanne Cedex, France

**Supplementary Figure 1** Powder XRD patterns of the catalysts after testing: (a) AVPO-1, (b) AVPO-2, (c) AVPO-3, (d) AVPO-4, (e) AVPO-5. p:  $(\text{VO})_2\text{P}_2\text{O}_7$ ;  $\alpha_1$ :  $\alpha_{\text{I}}\text{-VOPO}_4$ ;  $\alpha_2$ :  $\alpha_{\text{II}}\text{-VOPO}_4$ ;  $\varepsilon$ :  $\varepsilon\text{-VOPO}_4$ ; v:  $\text{VPO}_4\cdot\text{H}_2\text{O}$ ;  $\delta$ :  $\delta\text{-VOPO}_4$ .

**Supplementary Figure 2** Laser Raman spectra of the catalysts after testing: (a) AVPO-1, (b) AVPO-2, (c) AVPO-3, (d) AVPO-4, (e) AVPO-5. p:  $(\text{VO})_2\text{P}_2\text{O}_7$ ;  $\alpha_1$ :  $\alpha_{\text{I}}\text{-VOPO}_4$ ;  $\alpha_2$ :  $\alpha_{\text{II}}\text{-VOPO}_4$ ;  $\varepsilon$ :  $\varepsilon\text{-VOPO}_4$ ; v:  $\text{VPO}_4\cdot\text{H}_2\text{O}$ ;  $\delta$ :  $\delta\text{-VOPO}_4$ .



**Supplementary Figure 1**



**Supplementary Figure 2**