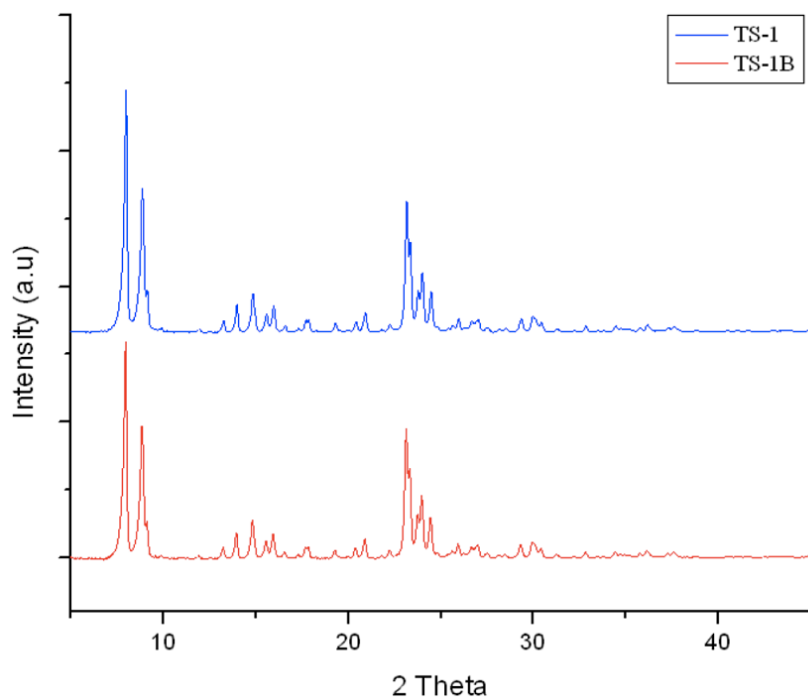
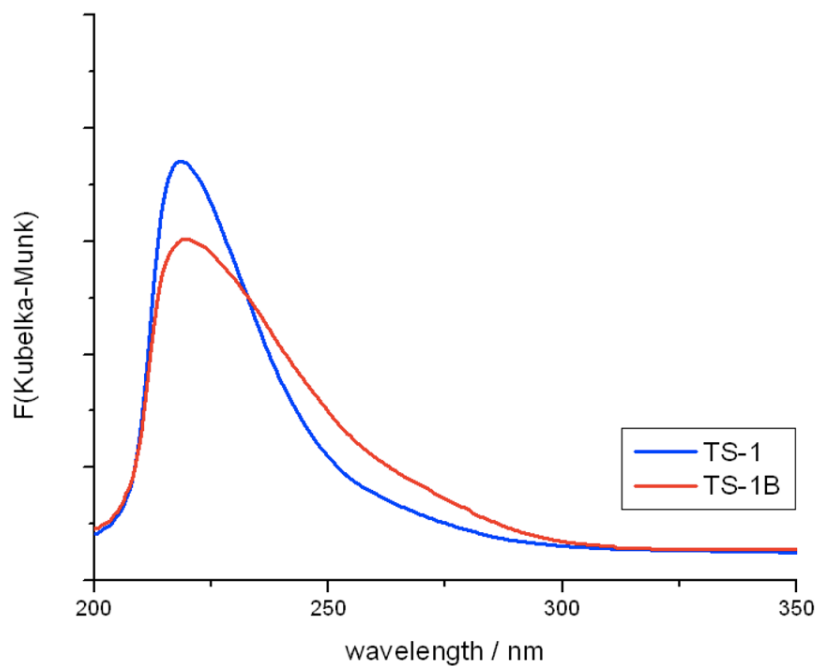


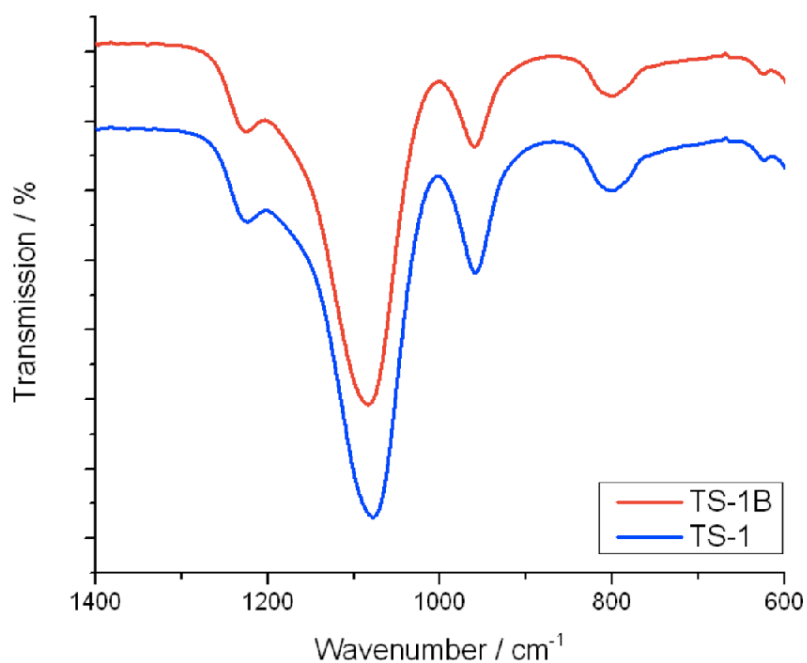
## Supplementary Information



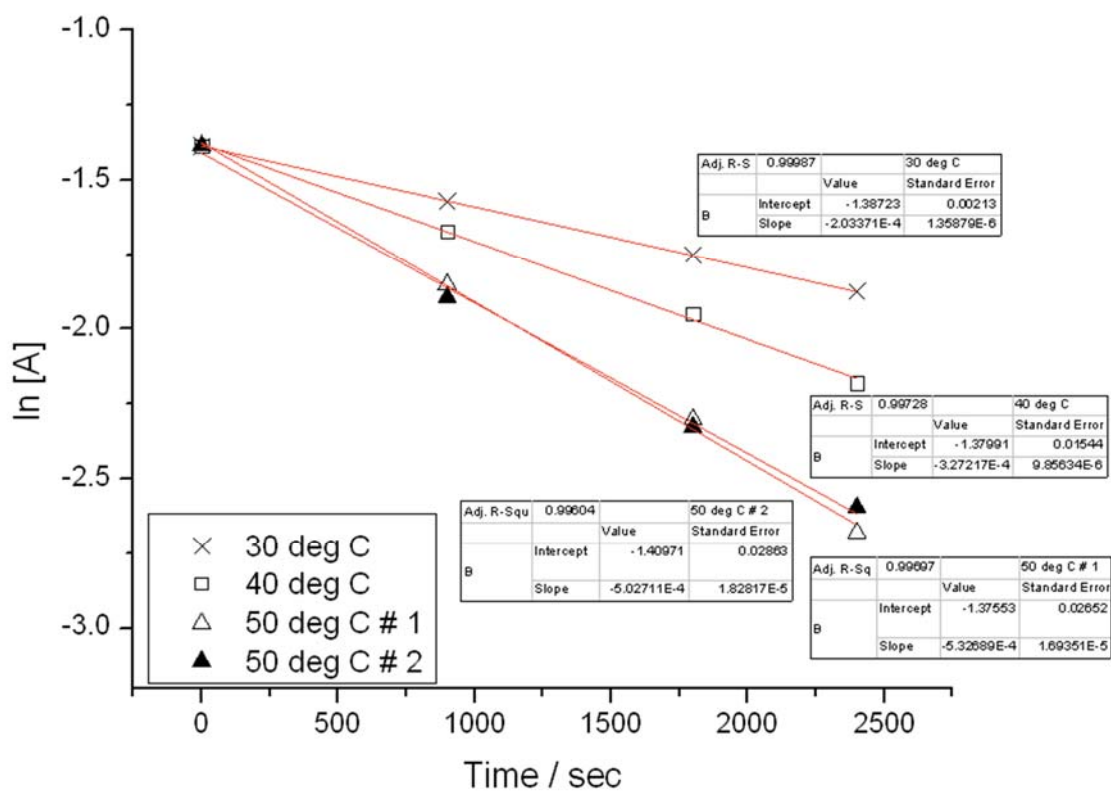
**Figure S1.** XRD pattern of hydrothermally Gsynthesised TS-1 (blue, top) and TS-1B, following treatment of TS-1 in  $\text{NH}_4\text{HF}_2$  (red, bottom).



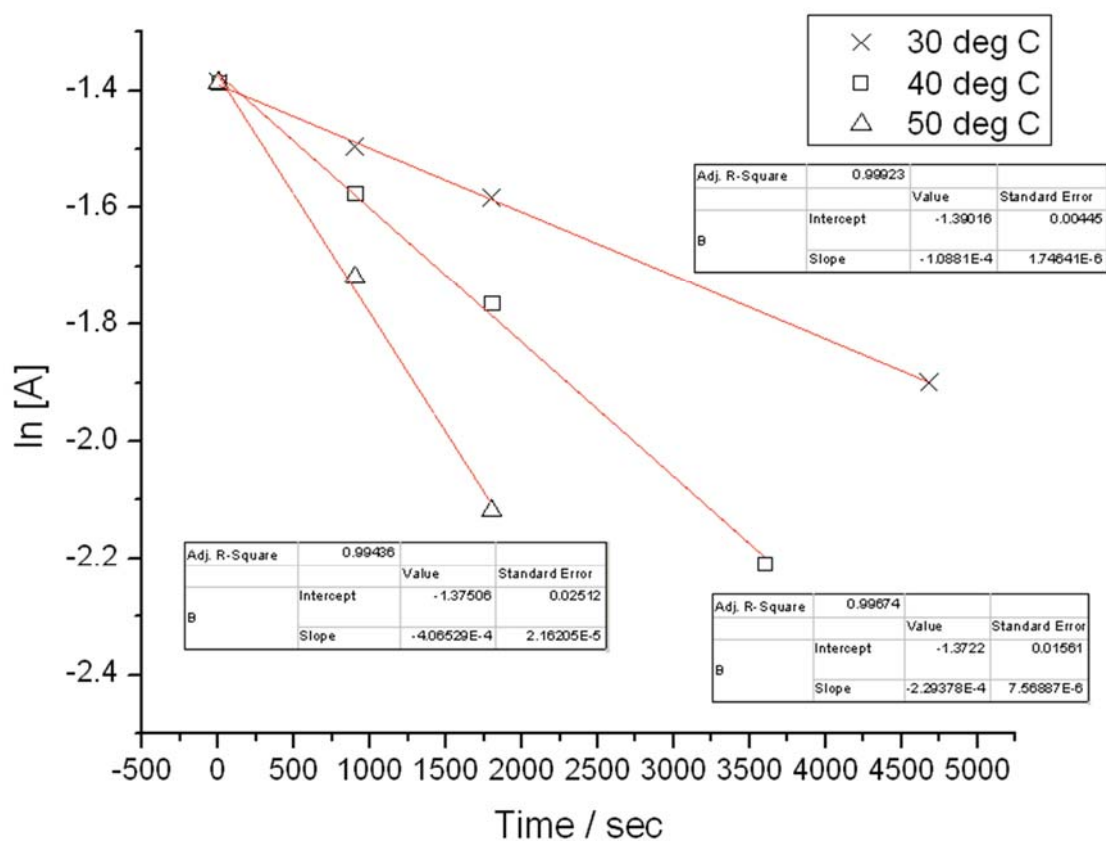
**Figure S2.** DRUVG-Vis spectra of (blue) TS-1 and (red) TS-1B.



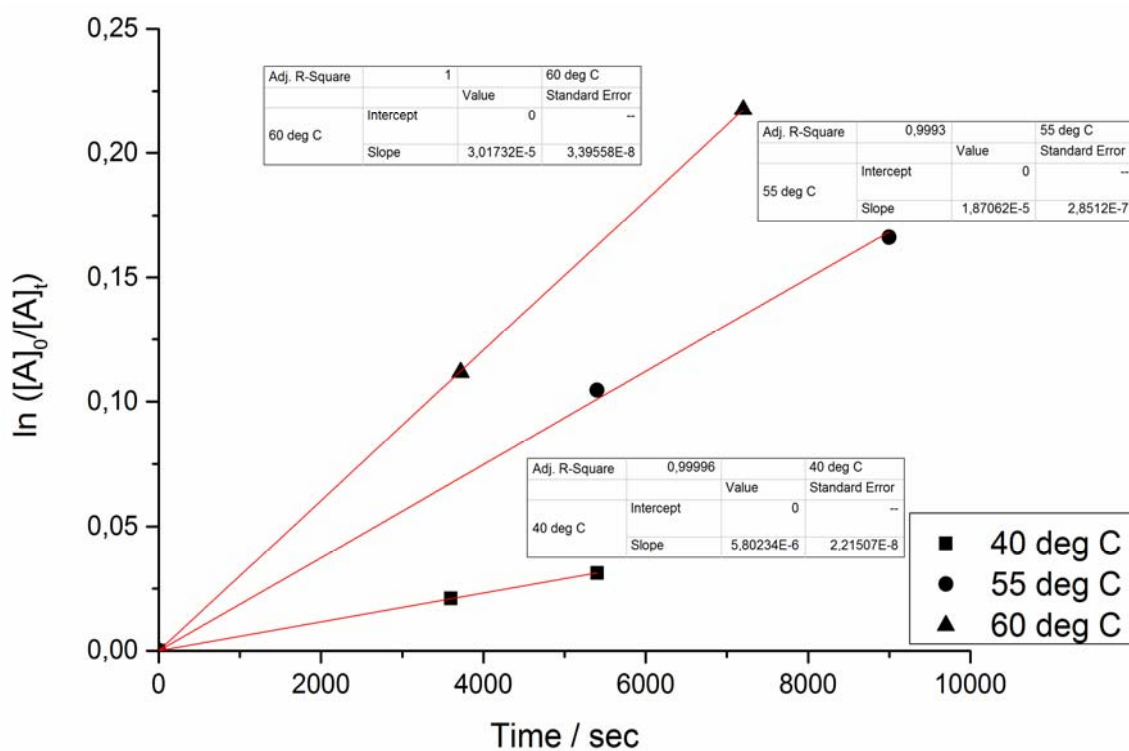
**Figure S3.** FTIR spectra of (blue) TS-1 and (red) TS-1B. Normalised intensity of  $960\text{ cm}^{-1}$  band in TS-1 = 0.144. Normalised intensity of  $960\text{ cm}^{-1}$  band in TS-1B = 0.098.



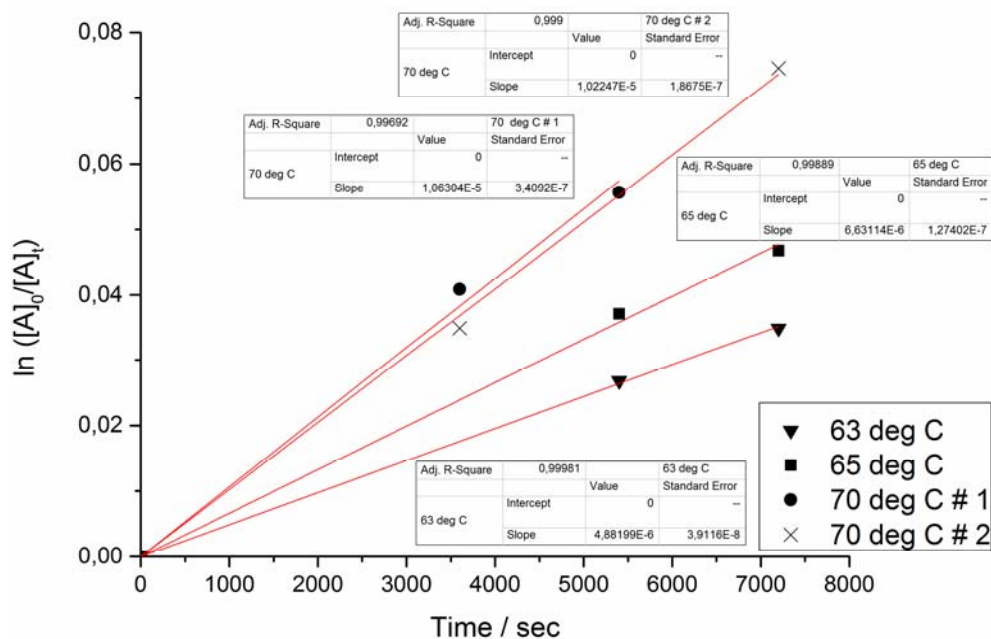
**Figure S4.** Initial rate analysis for allyl alcohol epoxidation with TS-1.



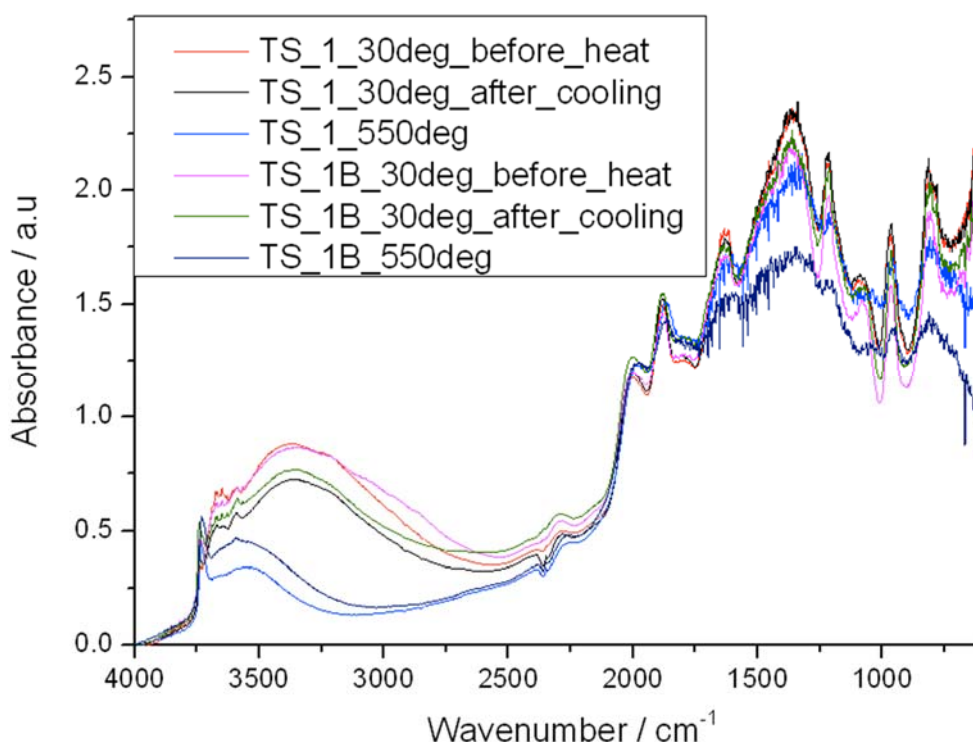
**Figure S5.** Initial rate analysis for allyl alcohol epoxidation with TS-1B (right). The filled triangles in the left figure indicate a second test performed at 50 °C in order to determine the reproducibility of the rate constant.



**Figure S6.** Initial rate analysis for  $H_2O_2$  decomposition with TS-1.



**Figure S7.** Initial rate analysis for H<sub>2</sub>O<sub>2</sub> decomposition with TS-1B. The crosses in Figure S6 indicate a second test performed at 70 °C in order to determine the reproducibility of the rate constant.



**Figure S8.** FTIR data of TS-1 and TS-1B during various states of heating/hydration. Each sample was measured thrice: once prior to heating (before heat), once at 550 °C (550 deg) and once after cooling to room temperature once more (after cooling). As can be seen, both samples display almost identical behaviour. The increased intensity of the broad feature at  $\pm 3500 \text{ cm}^{-1}$  in TS-1B, which is indicative of silanol nests, indicates that there are more defect sites present following NH<sub>4</sub>HF<sub>2</sub> treatment.

**Table S1.** Physical and textural properties of the samples.

Entry	Sample	$S_{\text{BET}}$ ( $\text{m}^2 \cdot \text{g}^{-1}$ ) <sup>a</sup>	$V_{\text{micro}}$ ( $\text{cm}^3 \cdot \text{g}^{-1}$ ) <sup>b</sup>	Si/Ti molar ratio <sup>c</sup>	Ti (wt. %) <sup>c</sup>
1	TS-1	368	0.138	40.4	$1.7 \pm 0.08$
2	TS-1B	375	0.136	43.5	$1.6 \pm 0.14$

<sup>a</sup> BET surface area ( $S_{\text{BET}}$ ) is calculated from the Brunauer-Emmett-Teller method; <sup>b</sup> micropore volume ( $V_{\text{micro}}$ ) calculated from the  $t$ -plot method; <sup>c</sup> Si/Ti molar ratio and Ti loading determined by EDS.

**Table S2.** ICP analysis of the samples, and fluorine content of TS-1B.

Entry	Sample	Fe ppm <i>wt/wt</i>	Ti % <i>wt/wt</i>	F % <i>wt/wt</i>
1	TS-1	326	1.95	-
2	TS-1B	254	1.69	<0.1

**Table S3.** Comparison of Fe and Ti activity for  $\text{H}_2\text{O}_2$  decomposition. Fe-silicalite-1 was synthesised according to our previous work (reference 29 in the manuscript), and contained a loading of 0.5 wt. %. The mass of Fe-silicalite-1 tested led to an equivalent Fe loading to that obtained from the impurity content of TS-1 being evaluated.

Entry	Sample	Fe (mg)	Ti (mg)	$\text{H}_2\text{O}_2$ decomposition(%) after 90 min
1	Ti-Silicalite-1 (326 ppm Fe)	0.0163	0.975	12.76
2	Fe-Silicalite-1 (0.5 wt. % Fe)	0.0163	0	0

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