

Electronic Supplementary Information (ESI)

Improved ethanol dehydration catalysis by superior acid properties of Cs-impregnated silicotungstic acid supported on silica

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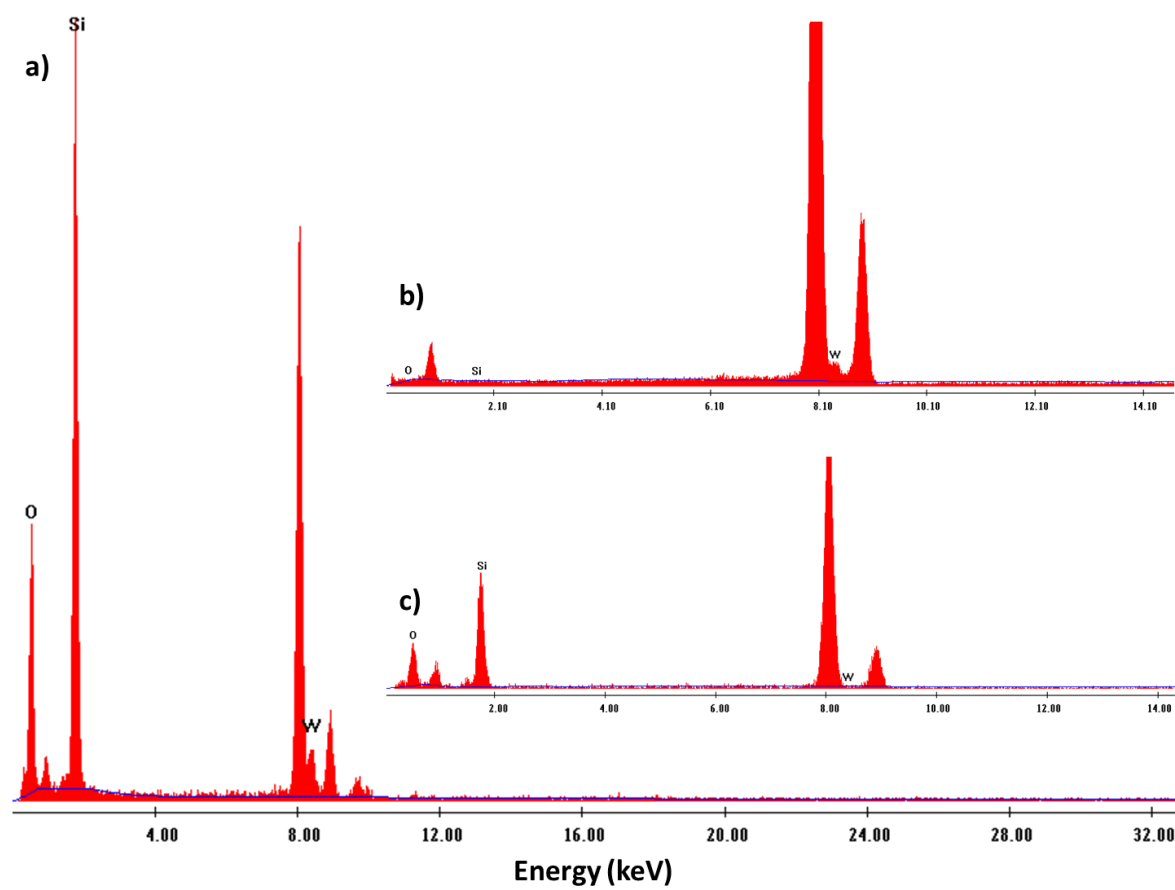


Figure S1: EDX spectra recorder for the STA-36 catalyst (a), the bulk H₄SiW₁₂O₄₀ crystallite (b) and for comparison pure A200 support (c).

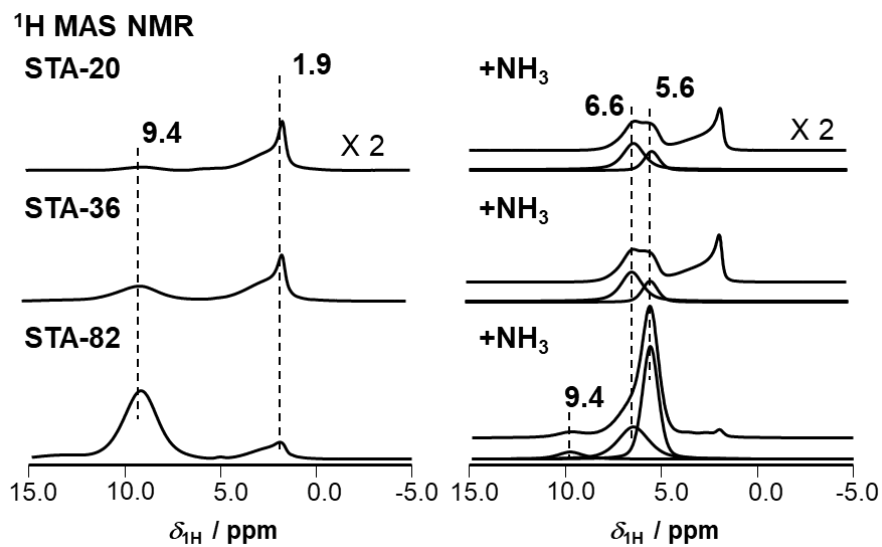


Figure S2: ^1H MAS NMR spectra of STA-20, STA-36, and STA-80 (left) and after loading with NH_3 (right). Shown are also the de-convoluted peaks of acid sites at $\delta_{1\text{H}} = 5.6, 6.6,$ and 9.4 ppm, respectively. The spectra of STA-20 are magnified by factor 2 and not weight-corrected.

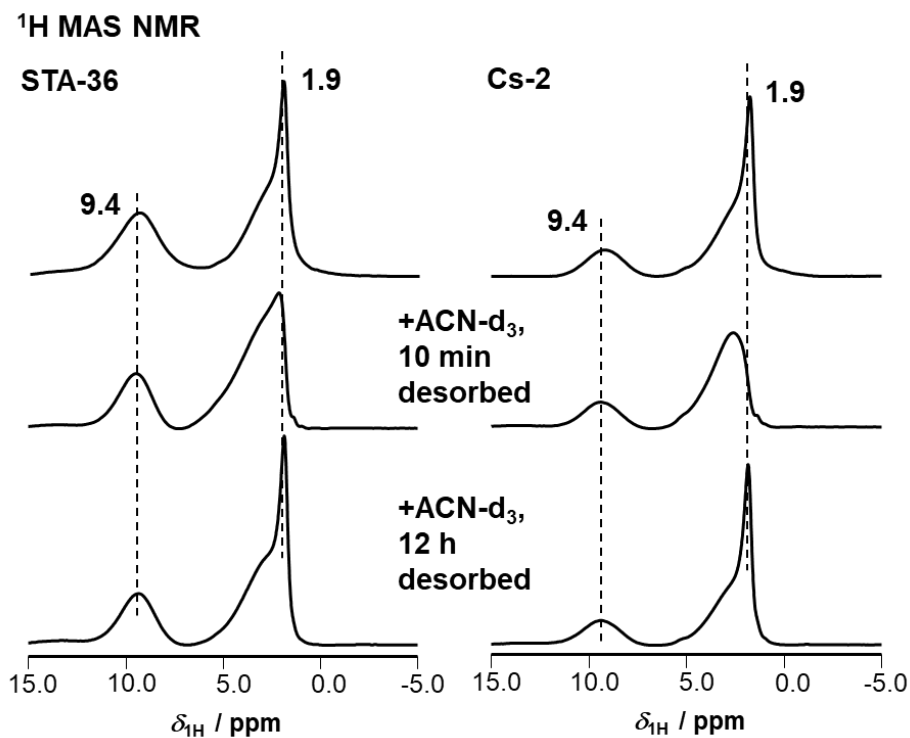


Figure S3: ¹H MAS NMR spectra of STA-36 (left) and Cs-2 (right). From top to bottom: activated material, spectra 10 min in vacuum after loading acetonitrile-d₃, and after removing the physisorbed acetonitrile-d₃ in vacuum overnight. The acid site peaks at 9.4 ppm remain untouched by the weak base, whereas peaks of Si-OH groups at 1.9 ppm show a typical low-field shift upon coverage with acetonitrile-d₃ after 10 min, verifying complete loading.

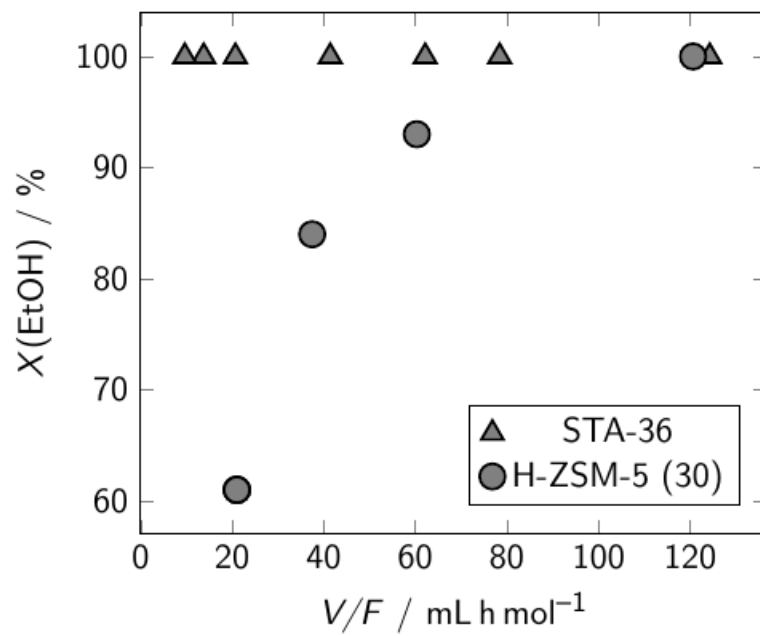


Figure S4: Volume of catalyst V used to obtain the respective ethanol conversion of a feed F of one mol/h compared to zeolite catalyst ZSM-5 with a Si/Al ratio of 30.

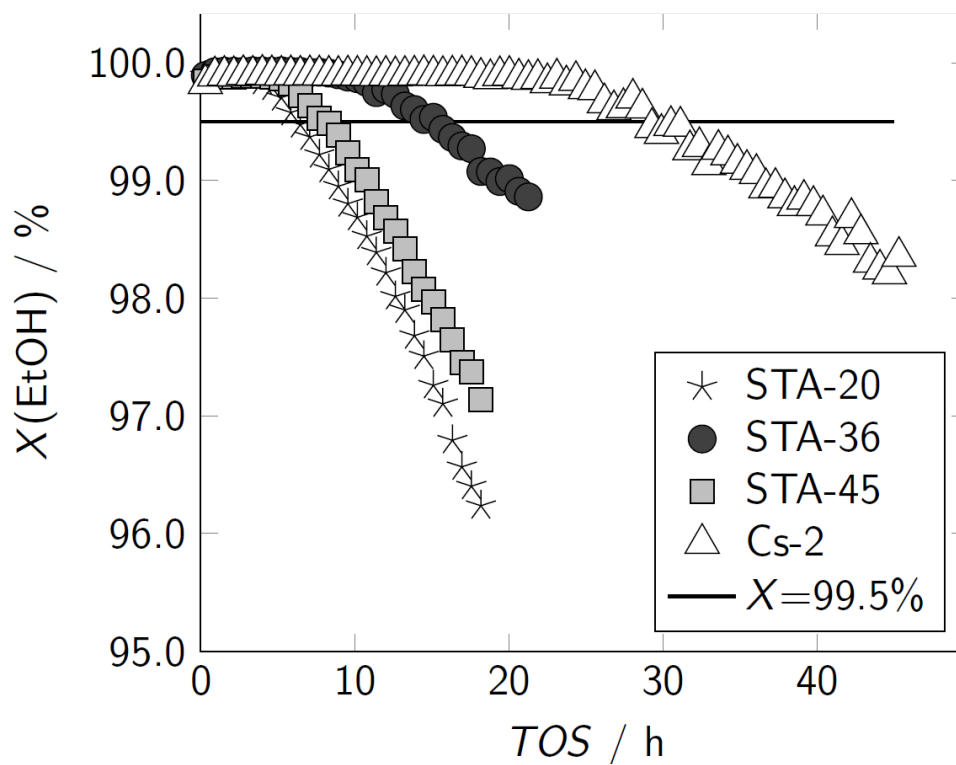


Figure S5: Conversion-time plots of heteropoly acid (HPA) catalysts before and after CsOH-impregnation showing the longest lifetime for an intermediate STA-loading of 36 wt% (STA-36). For comparison, only the post-modified catalysts with longest lifetime (Cs-2) is plotted.