

Supplementary Materials

Vanadia-Zirconia and Vanadia-Hafnia Catalysts for Utilization of Volatile Organic Compound Emissions

Satu Ojala ^{1,*}, Tiina Laitinen ¹, Sian Leneuf de Neufville ², Mari Honkanen ³, Minnamari Vippola ³, Mika Huuhtanen ¹ and Riitta L. Keiski ¹

¹ Environmental and Chemical Engineering, Faculty of Technology, University of Oulu, Finland; firstname.lastname@oulu.fi

² Institut Universitaire de Technologie de Poitiers, Université de Poitiers, France; sianleneuf@gmail.com

³ Tampere Microscopy Center, Tampere University, Finland; firstname.lastname@tuni.fi

* Correspondence: satu.ojala@oulu.fi;

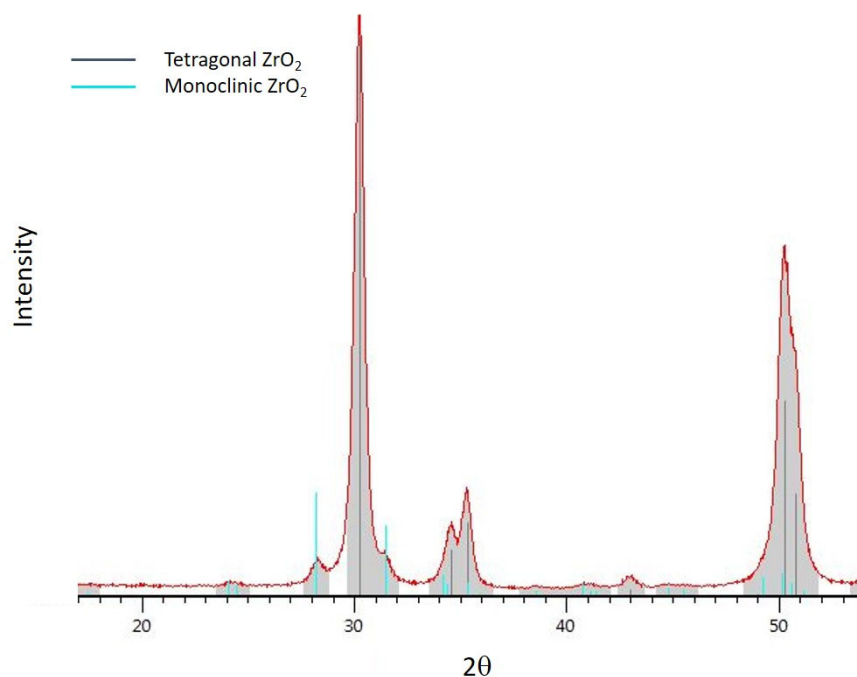


Figure S1: XRD diffractogram of 4VZr SG catalyst with 2θ range of 27–54°.

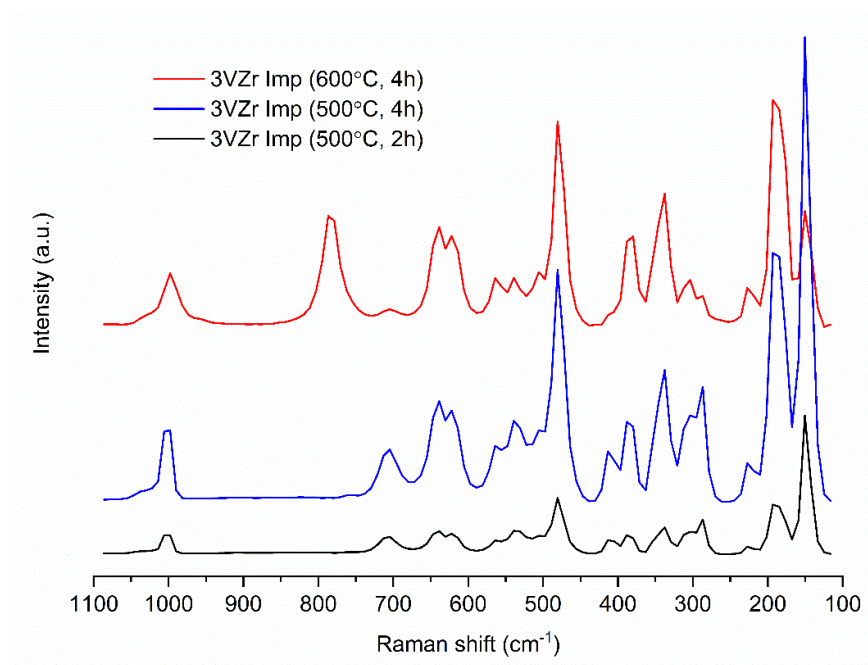


Figure S2: Comparison of Raman spectra of impregnated 3VZr catalysts having different calcination treatments.

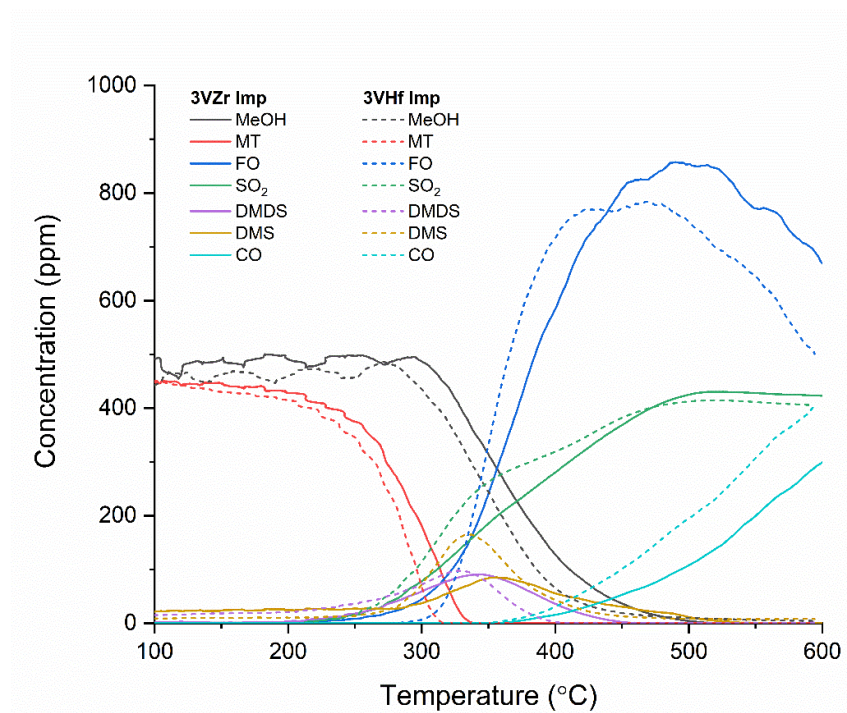


Figure S3: Comparison of 3VZr and 3VHf catalysts; consumptions of reactants and formation of different reaction products.

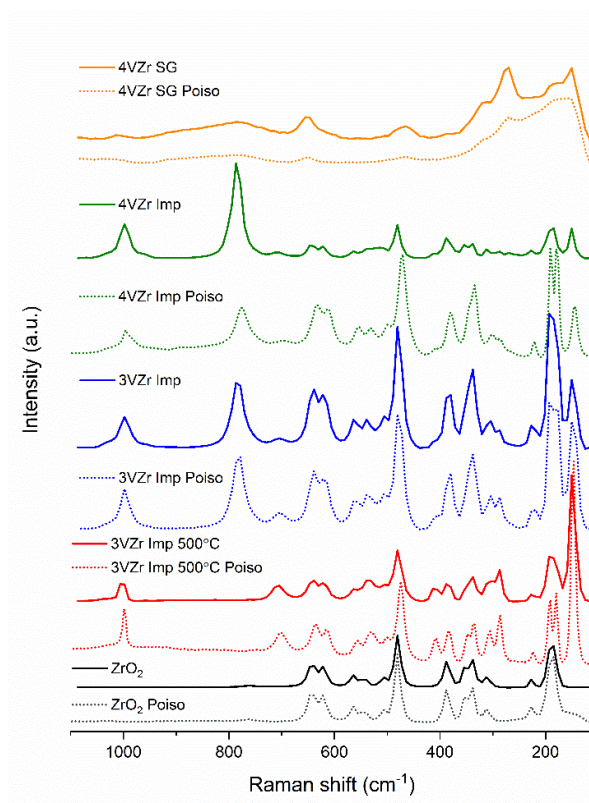


Figure S4: Raman spectra of fresh and poisoned VZr catalysts.

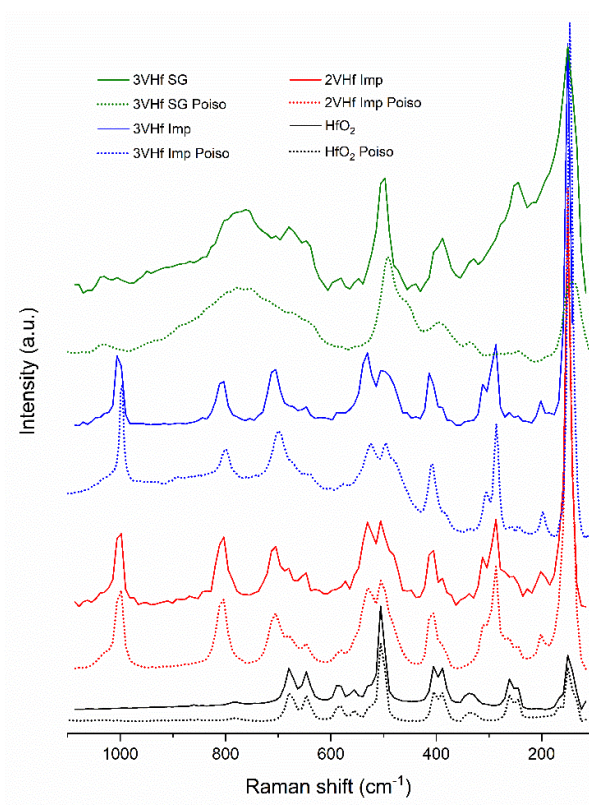


Figure S5: Raman spectra of fresh and poisoned VHf catalysts.

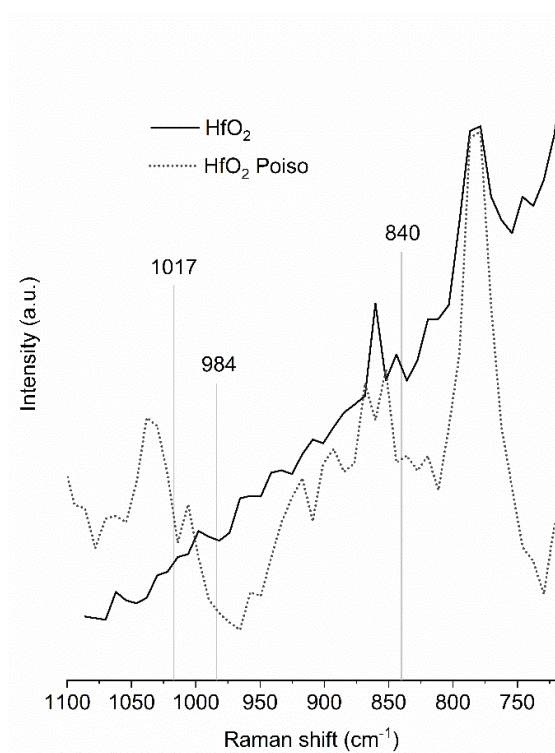


Figure S6: Raman spectrum of fresh and poisoned HfO₂ support in the spectral range of 700–1100 cm⁻¹.

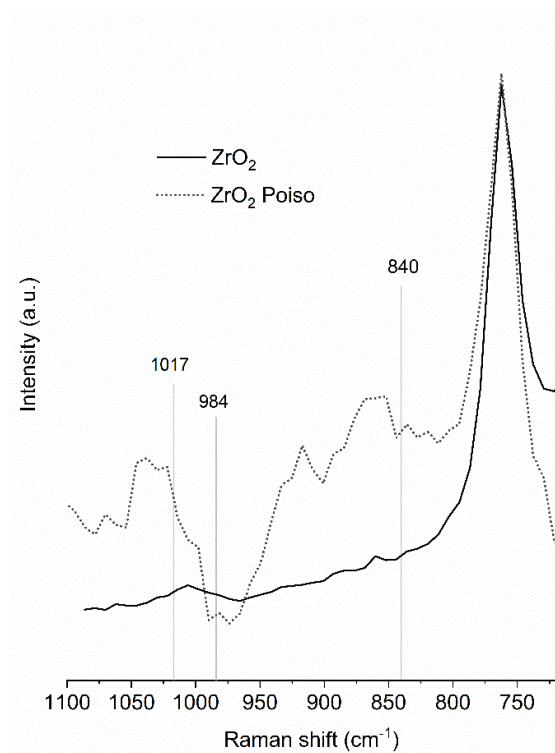


Figure S7: Raman spectrum of fresh and poisoned ZrO₂ support in the spectral range of 700–1100 cm⁻¹.

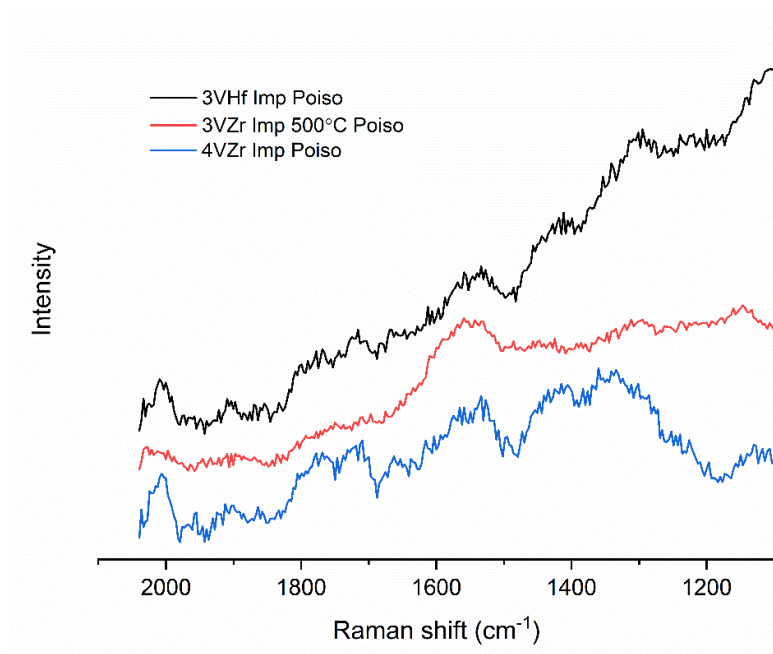


Figure S8: Raman spectra of poisoned 3VHf, 3VZr and 4VZr catalysts in Raman shift range of 1100–2100 cm^{-1} .

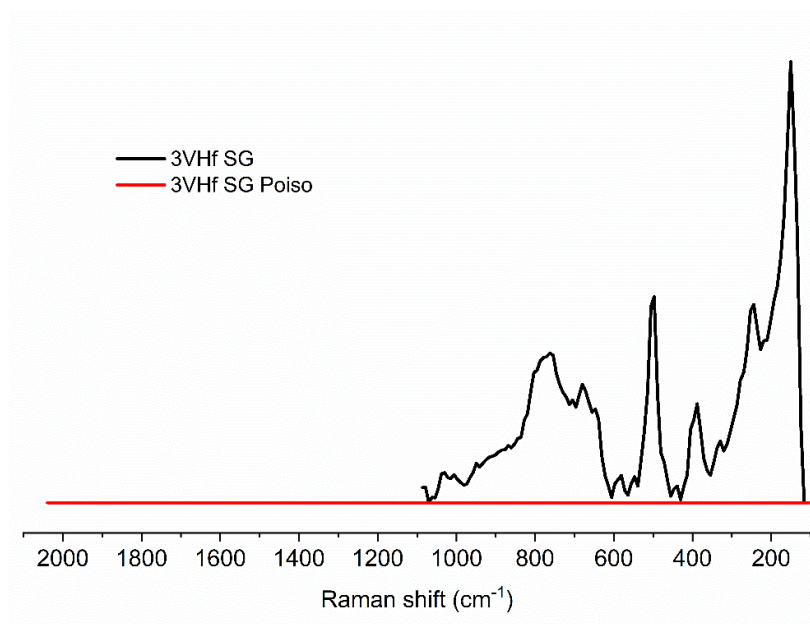


Figure S9: Raman spectra of fresh and poisoned 3VHf SG catalyst. Y-axis is similar for both the spectra.

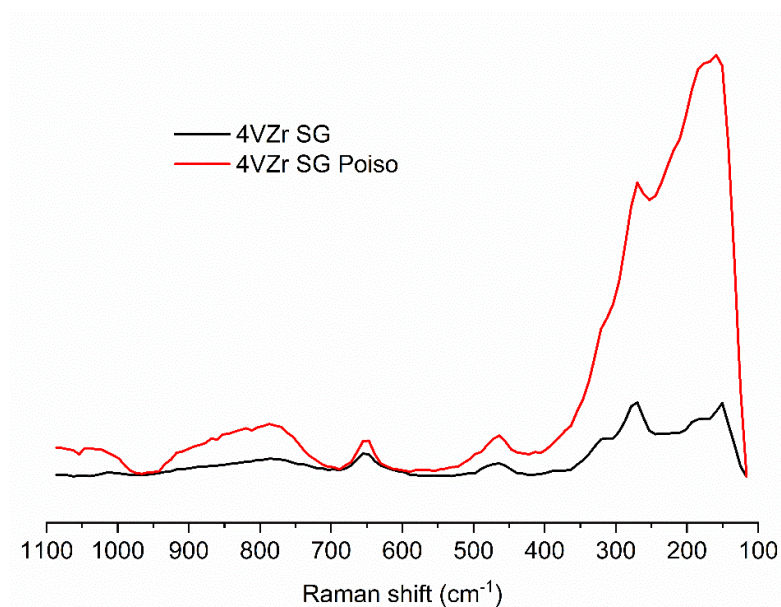


Figure S10: Raman spectra of fresh and poisoned 4VZr SG catalyst. Y-axis is similar for both the spectra.

Table S1: Selectivity of formaldehyde at indicated reaction temperature. Temperatures are given with 5 °C accuracy and selectivities given with 1% accuracy.

Catalyst	Temperature at Maximum Selectivity	Maximum Selectivity	Temperature at Maximum Formaldehyde Production	Selectivity at Maximum Formaldehyde Production
4VZr SG	375	63	395	63
4VZr Imp	445	63	495	63
3VZr Imp	450	62	485	60
3VZr Imp 500 °C	475	61	505	62
3VHf SG	370	57	390	55
3VHf Imp	405	62	465	58
2VHf Imp	415	60	470	59