Supporting Information

Secondary Alcohols as Rechargeable Electrofuels: Electrooxidation of Isopropyl Alcohol at Pt Electrodes

Fabian Waidhas[1], Sandra Haschke[2], Peyman Khanipour[3], Lukas Fromm[4], Andreas Görling[4], Julien Bachmann[2,5], Ioannis Katsounaros[3], Karl J.J. Mayrhofer[3,6], Olaf Brummel[1]*, Jörg Libuda[1]

[1] *Interface Research and Catalysis, ECRC, Friedrich-Alexander-Universität Erlangen-Nürnberg, Egerlandstrasse 3, D-91058 Erlangen, Germany*

[2] *Lehrstuhl für Chemistry of Thin Film Materials, Friedrich-Alexander-Universität Erlangen-Nürnberg, IZNF, Cauerstrasse 4, D-91058 Erlangen, Germany*

[3] *Helmholtz-Institute Erlangen-Nürnberg for Renewable Energy (IEK-11), Forschungszentrum Jülich GmbH, Erlangen, 91058, Germany*

[4] *Lehrstuhl für Theoretische Chemie, Friedrich-Alexander-Universität Erlangen-Nürnberg, Egerlandstrasse 3, 91058 Erlangen, Germany*

[5] *Institute of Chemistry, Saint Petersburg State University, 26 Universitetskii Prospect, Saint Petersburg, Petergof 198504, Russia*

[6] *Department of Chemical and Biological Engineering, Friedrich-Alexander-Universität Erlangen-Nürnberg, Egerlandstrasse 3, 91058 Erlangen, Germany*

**corresponding author: Olaf Brummel; olaf.brummel@fau.de*

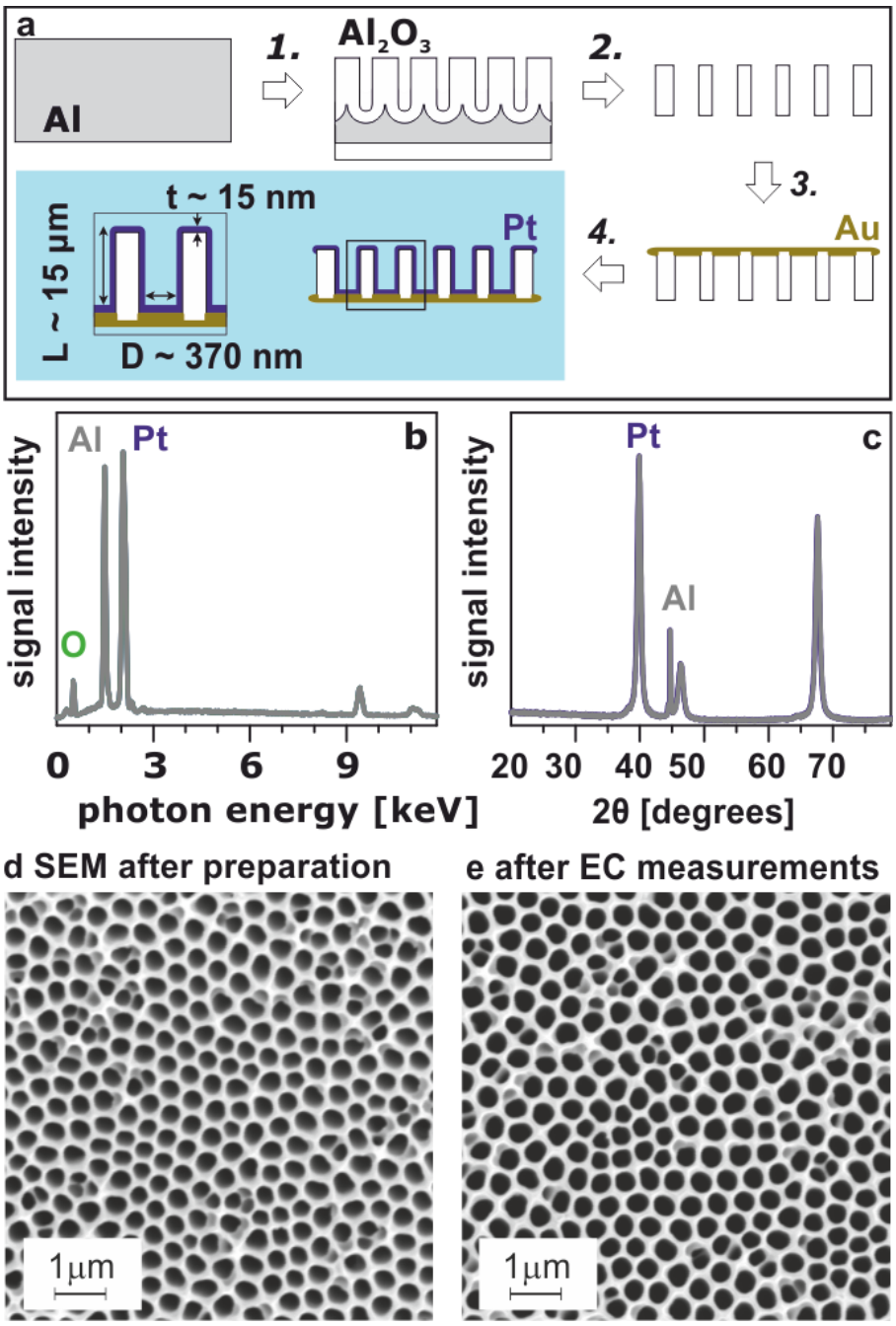

Figure S1: Nanotubular platinum model catalysts; (a) schematic representation of the preparation procedure (b) EDX spectrum, (c) XRD analysis and SEM images (d) before preparation and (e) after EC measurements.

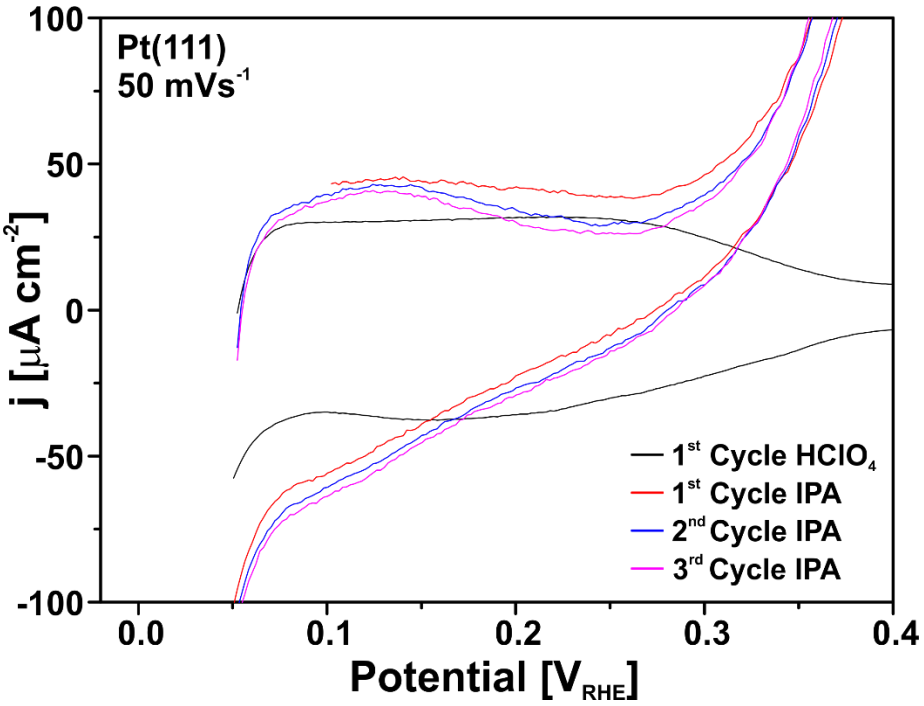

Figure S2: Hydrogen region of the cyclic voltammograms of Pt(111) in the absence and the presence of IPA (0.2 M) shown in **Figure 1**; CVs were recorded in 0.1 M $HClO_4$ with and scan rate of 50 mV s^{-1}.

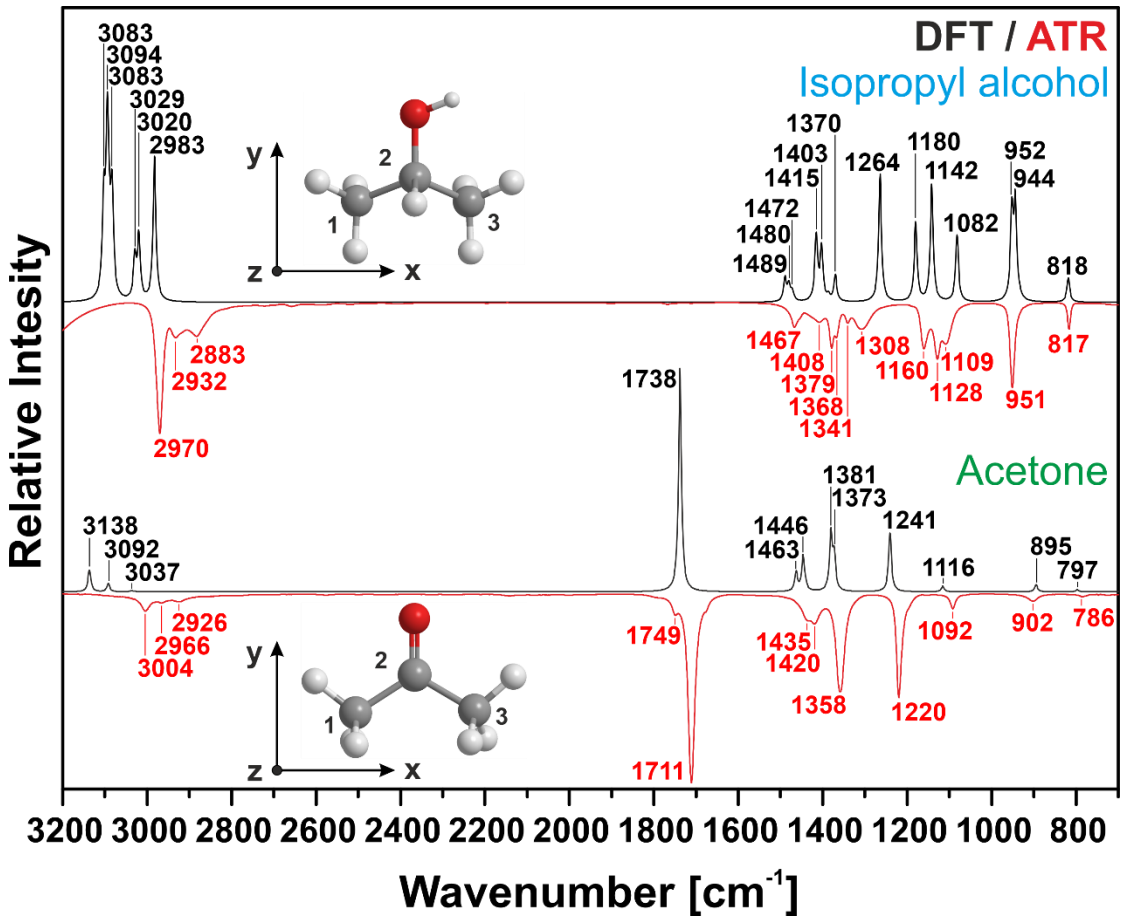

Figure S3: Infrared spectra of IPA and acetone in the spectral region from 700 to 3200 cm^{-1}. Simulated spectra from PBE/def2-TZVP level of theory (black) and experimental (red) IR spectra (ATR) of IPA and acetone.

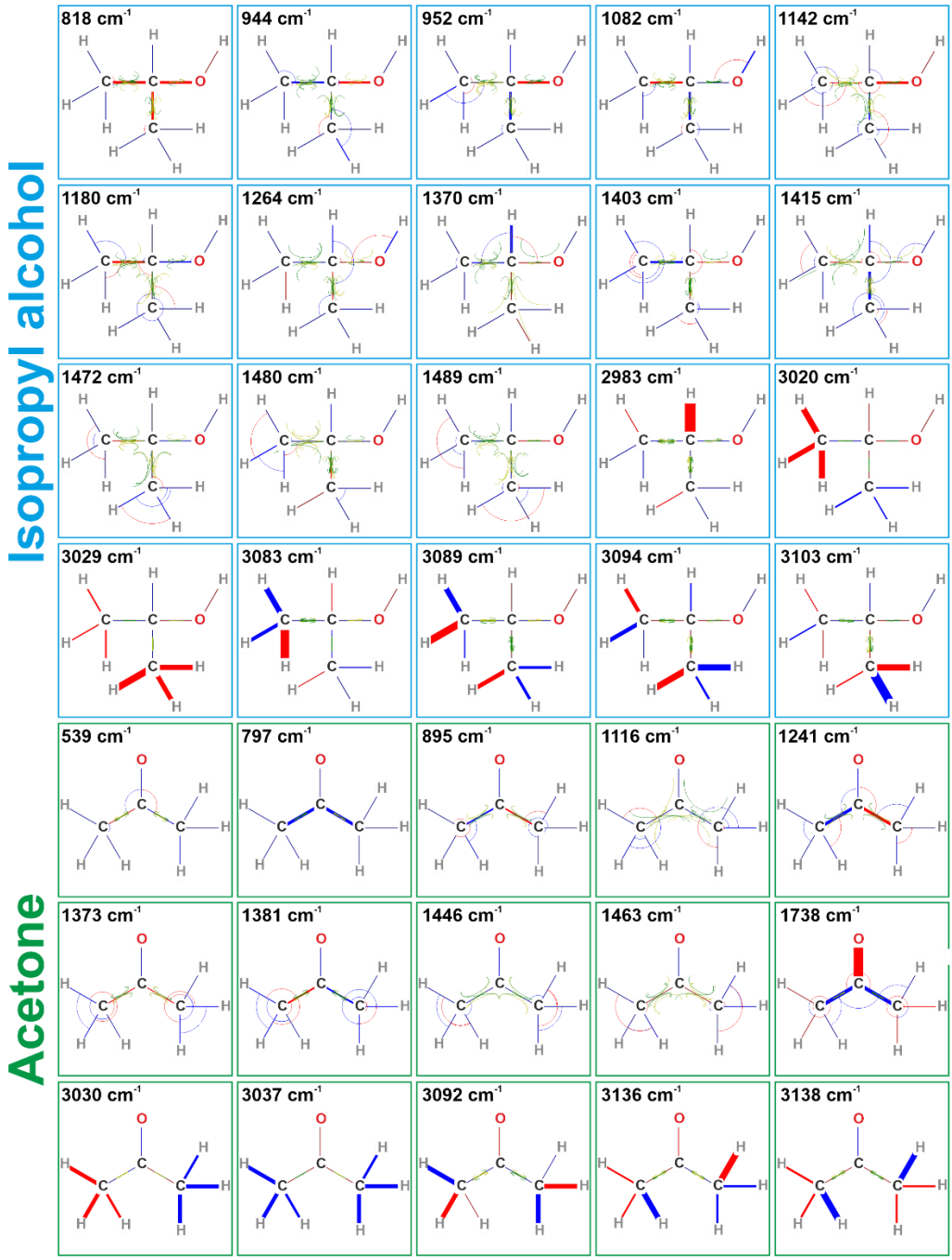

Figure S4: Visualization of the different vibrational modes and the corresponding band positions of the calculated spectra of IPA and acetone depicted in **Figure S3**. The vibrational modes are visualized using the program QVibeplot.[1]

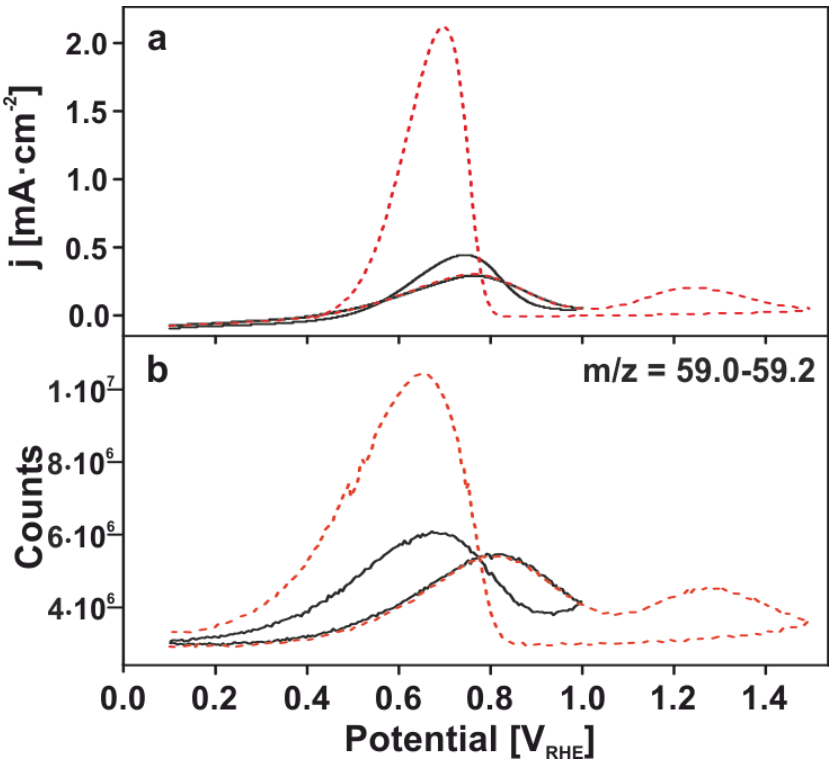

Figure S5: Cyclic voltammetry of IPA oxidation on polycrystalline Pt monitored by EC-RTMS using an SFC coupled with DART for upper potential limits of 1.0 and 1.5 V_{RHE}; (a) cyclic voltammogram and (b) the corresponding DART signal intensity for mass m/z = 59.1 ± 0.1 using a solution of 0.2 M IPA in 0.1 M $HClO_4$ with a flow rate of 0.5 $mL \cdot min^{-1}$ and a scan rate of 10 $mV \cdot s^{-1}$.

Reference

1. Laurin, M., QVibeplot: A Program To Visualize Molecular Vibrations in Two Dimensions. *Journal of Chemical Education* **2013**, *90*, 944-946.