Supporting Information

Electrocatalytic cross-coupling of biogenic diacids for the sustainable production of fuels

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1. Calculations
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1. Calculations

Calculation of charge chronoamperometry (Q = charge, I = current, t = time):

\[ Q = \int_{x}^{y} I \, dt \]

Calculation of charge potentiometry:

\[ Q = It \]

Calculation of the faradiac efficiency (n_{mol} = amount of total product amount in mol, n = number of electrons transferred, F = Faraday constant):

\[ F_{eff} = \frac{n_{mol}nF}{Q} \cdot 100\% \]

For 1 faradaic equivalent the equation becomes (n_{mol-spl} = simplified factor [dimensionless]):

\[ F_{eff} = n_{mol-spl} \cdot 100\% \]
3. NMR spectra

$^1$H-NMR: Tertbutyl-i

$^1$H-NMR: mono-Methyl hydrogen methylsuccinic acid (MMSA)
$^1$H-NMR: mono-Ethyl hydrogen succinate (HESA)
$^{1}$H-NMR: Ethyl 5-methylhexanoate
$^1$H-NMR: Dimethyl 2,5-dimethyladipiate
$^1$H-NMR: Methyl 2,5-dimethylhexanoate
$^1$H-NMR: 2,9-Dimethyldecane
4. Additional charts

[Chemical structure diagram and NMR spectrum graph]
Figure 1a: Variation of different ratios of MMSA with IVA. Conditions: 0 °C, MeOH:H$_2$O 80:20, 1 farad equivalent, 0.1 M NEt$_3$, 100 mAcm$^{-2}$, WE: Pt, CE: Ti. Yield of MDH/ DDH related to MMSA, DH related to IVA (total Volume 5 mL).

Figure 2a: Variation of the electrolyte concentration. Conditions: 0 °C, MeOH:H$_2$O 80:20, 1 farad equivalent, 100 mAcm$^{-2}$, WE: Pt, CE: Ti, 0.33 M MMSA, 1.3 M IVA. Yield of MDH/ DDH related to MMSA, DH related to IVA (total Volume 5 mL).
Figure 3a: Variation of the solvent mixture. Conditions: 0 °C, 1 farad equivalent, 100 mAc㎡⁻², WE: Pt, CE: Ti, 0.33 M MMSA, 1.3 M IVA, 0.1 M NE₃ (for 100% Water: 0.1 M MMSA, 0.4 M IVA). Yield of MDH/ DDH related to MMSA, DH related to IVA (total Volume 5 mL).

Figure 4a: Screening of (RuₓTi₁₋ₓ)O₂ on titanium plates in comparison with Pt. Conditions: 0 °C, 1 farad equivalent, 100 mAc㎡⁻², MeOH as solvent, CE: Ti, 0.33 M MMSA, 1.3 M IVA, 0.1 M NE₃. Yield of MDH/ DDH related to MMSA, DH related to IVA (total Volume 2 mL).
5. Total faradaic efficiency charts (Complete new Section!)

For Figure 1(left) + Figure 1a: Variation of different ratios of MMSA/HESA with IVA. Conditions: 0 °C, MeOH:H₂O 80:20, after 1 farad equivalent, 0.1 M NEt₃, 100 mAcm⁻², WE: Pt, CE: Ti.

For Figure 1(right) + Figure 2a: Variation of the electrolyte concentration. Conditions: 0 °C, MeOH:H₂O 80:20, after 1 farad equivalent, 0.33 M MMSA/HESA, 1.3 M IVA.
For Figure 2 + Figure 3a: Variation of the solvent mixture. Conditions: 0 °C, after 1 farad equivalent, 100 mA cm$^{-2}$, WE: Pt, CE: Ti, 0.33 M MMSA/HESA, 1.3 M IVA, 0.1 M NEt$_3$ (for 100% Water: 0.1 M MMSA/HESA, 0.4 M IVA).

For Figure 3 + Figure 4a: Screening of (Ru$_x$Ti$_{1-x}$)O$_2$ on titanium plates in comparison with Pt. Conditions: 0 °C, after 1 farad equivalent, 100 mA cm$^{-2}$, MeOH as solvent, CE: Ti, 0.33 M MMSA/HESA, 1.3 M IVA, 0.1 M NEt$_3$. 
For Figure 4: Screening of (Ru, Ti-x)O₂ on Ti and Pt plates with different electrolytes. Left: Using 0.1 M NEt₃ as electrolyte and base. Right: Using 0.1 M KOH as electrolyte and base. General conditions: 0 °C, after 1 farad equivalent, 100 mA cm⁻², MeOH as solvent, CE: Ti, 0.33 M MHO, 1.3 M IVA.

For Figure 5: Screening of (Ru, Ti-x)O₂ on Ti and Pt plates with different electrolytes. General conditions: 0 °C, after 1 farad equivalent, 100 mA cm⁻², MeOH as solvent, CE: Ti, 1 M MHO.