Sustainable Electro-organic Synthesis of Dicarboxylic Acids from Biogenic Shellac

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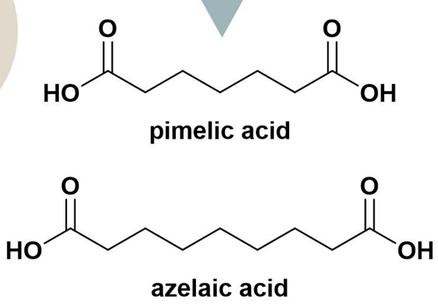
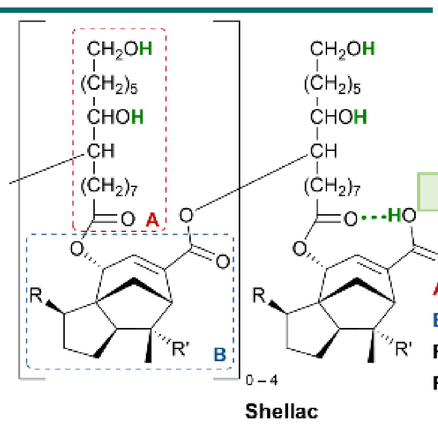
Introduction

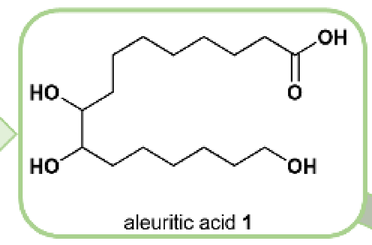
Shellac



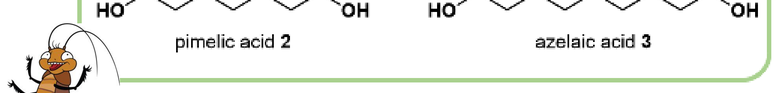


A Aleuritic acid
B Sesquiterpene
R -CH_2OH, -CHO, -COOH
R' -CH_3, -CH_2OH

Alkaline hydrolysis

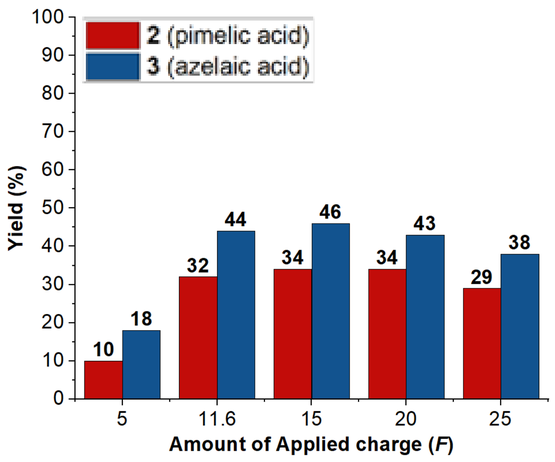


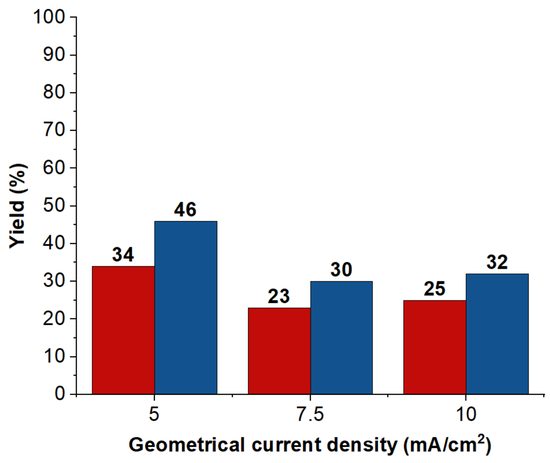
Electrocatalytic conversion

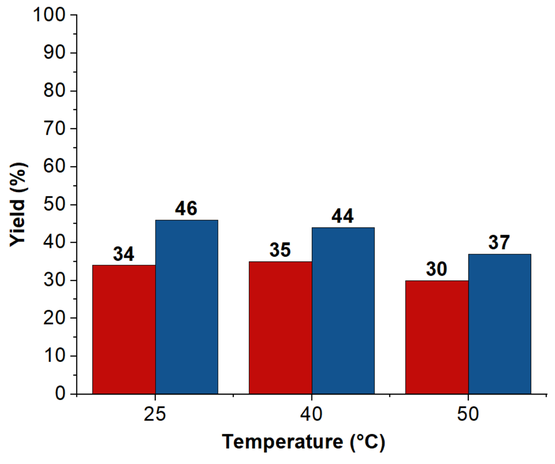


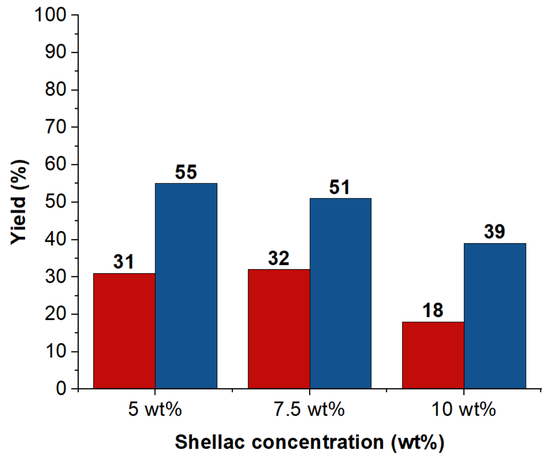
Shellac-derived dicarboxylic acids

Electrocatalytic conversion

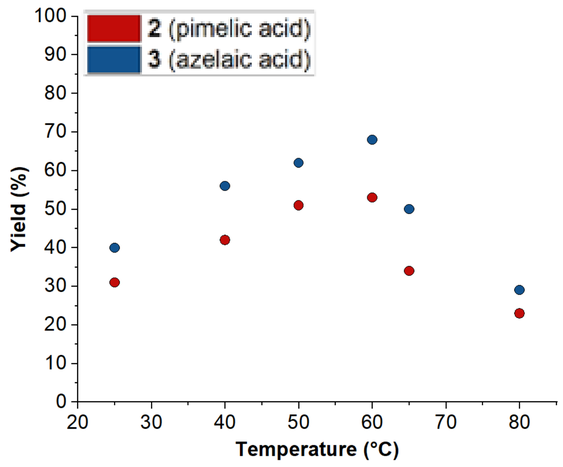


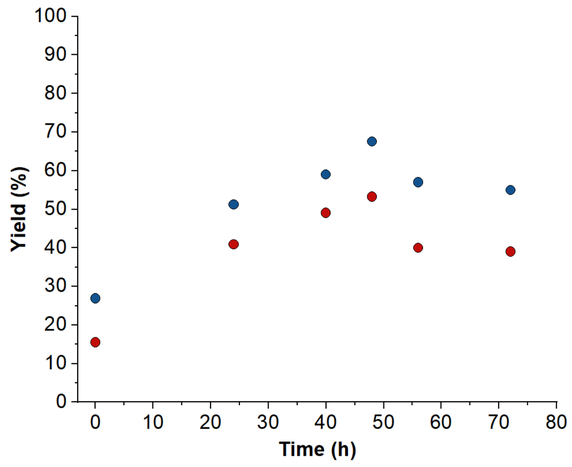




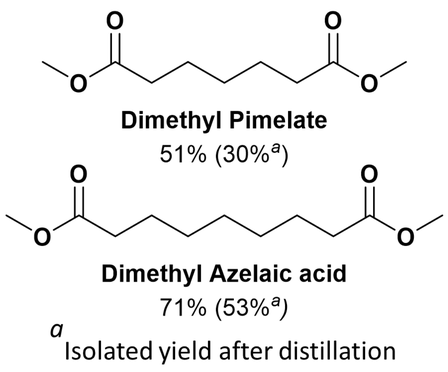


Alkaline hydrolysis





1. 1 M KOH, 60 °C, 48 h
2. (+)Ni(O)OH|(-)StSt
   5 mA.cm^{-2}, 15 *F*, RT
3. MeOH, H_2SO_4
4. [a]Distillation

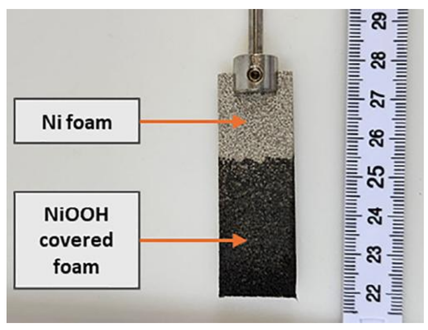


[a] Isolated yield after distillation

Reaction Scale-up

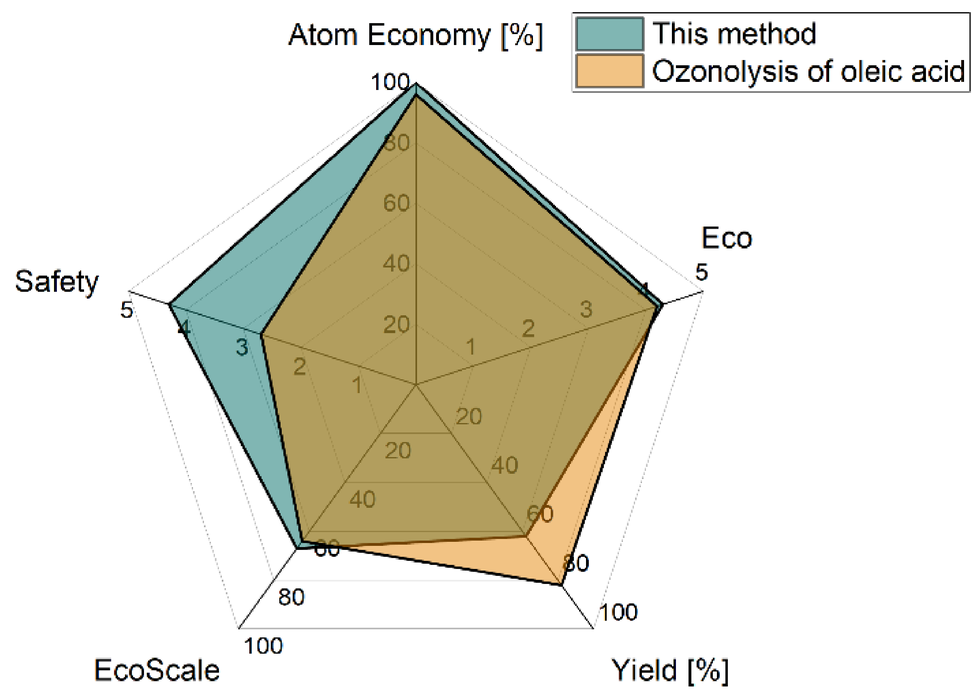
Screening scale → Cell A → Cell B → Cell C → Preparative scale

Anode area	6 cm^2	18 cm^2	28 cm^2
Scale	1.25 g	5 g	12.5 g
Amount of applied charge	15 *F*	20 *F*	20 *F*
Yield **2**	51%	46%	43% (30%[a])
Yield **3**	71%	65%	61% (53%[a])



[a]Isolated yield of the corresponding methyl esters

Sustainability consideration



References

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[2]T. Horsten and S. R. Waldvogel, *RSC Sustain.*, 2024, **2**, 1963-1968.

[3]R. Narobe, J. Schneider and S. R. Waldvogel, *Chem. Rec.*, 2026, **0**, e70152,

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