Supplementary Information

2 Microwave-assisted valorization of biodiesel byproduct glycerol to solketal

over *Musa acuminata* peel waste derived solid acid catalyst: Process optimization, kinetics, and thermodynamic study

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Fig. S1: (a) Thermo-gravimetric analysis (TGA), (b) XRD analysis, (c) FT-IR Spectra, (d) N_2 adsorption-desorption isotherm and BJH pore size distribution curve (inset) of the prepared sample BP-SO₃H-15-18-100. Reproduced from the Ref.¹.



Fig. S2: XPS analysis of catalyst. (a) Overall XPS survey spectrum of fresh catalyst and experimental spectra with deconvolution for (b) C1s, (c) for O1s, and (d) for S2p regions. Reproduced from the Ref. ¹.



Fig. S3: SEM micrographs at various magnifications (a-c) of catalyst. Scale bars: 500 nm (a), 10 μ m (b), 1 μ m (c). Elemental mapping unveiling carbon (d), oxygen (e), and sulfur (f) along with the SEM-EDX (g and h). TEM images at various magnifications, Scale bars: 50 nm (i), 20 nm (j). Reproduced from the Ref. ¹.



Fig. S4: ¹H NMR (a) and ¹³C NMR (b) of the obtained solketal. Reproduced from the Ref. ¹.



Fig. S5: (a) GC of the produced solketal, (b) Mass spectrum of R isomer of solketal, (c) Mass spectrum of S isomer of solketal, (d) Mass spectrum of glycerol. Reproduced from the Ref. ¹.



Fig. S6 ¹³C ssNMR data for fresh (pink) and spent (after 5 reaction cycles; blue) catalyst.

$$TOF = \frac{\% Conversion \, glycerol}{(Time)(Catalyst \, wt.\%)(Molar \, mass \, glycerol)} Eq. \, SI$$

References

R. Devasan, J. V. L. Ruatpuia, S. P. Gouda, P. Kodgire, S. Basumatary, G. Halder, &
 Samuel and L. Rokhum, *Sci. Reports 2023 131*, 2023, 13, 1–17.