

Supplementary Materials

Table S1 shows the surface, pore volume, and Ni nanoparticle content of the unmodified Ni/BC catalysts and the sulfuric acid activated biochar catalyst. **Figure S1** shows the TEM morphology of the catalyst surface, structure, the size of nickel nanoparticles and their distribution on the surface of Ni/BC catalyst following sulfuric acid activation of biochar itself. The chemical structure and function groups on the surface of the developed catalyst (Ni/BC) based on FTIR is shown in **Figure S2**. CO₂-TPD profile is shown in **Figure S3**.

Table S1. Surface area, pore volume and Ni nanoparticle content. .

Catalyst	Surface Area (m ² g ⁻¹)	Pore Volume (cm ³ g ⁻¹)	Ni Content (%)
Ni/BC	74.8	0.1	15.1
Ni/BC (H ₂ SO ₄ acid activated)	353.5	0.3	14.7

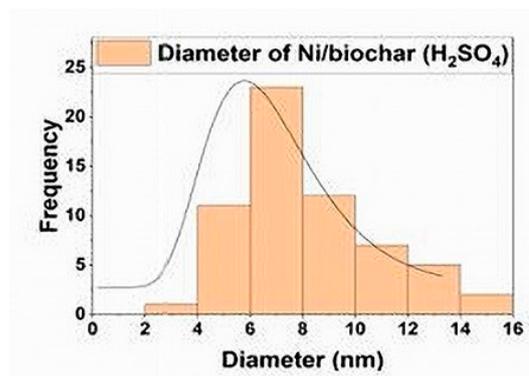
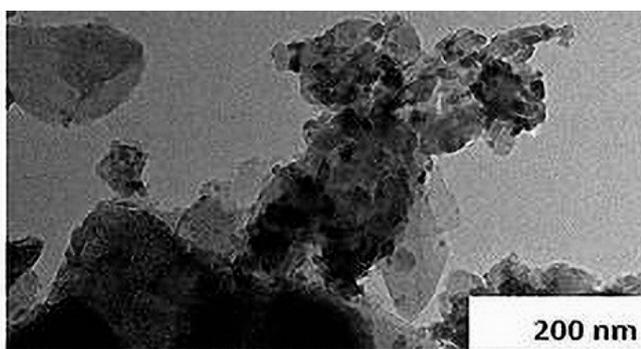


Figure S1. TEM analysis and histograms of the Ni metal nanoparticle sizes of Ni/BC.

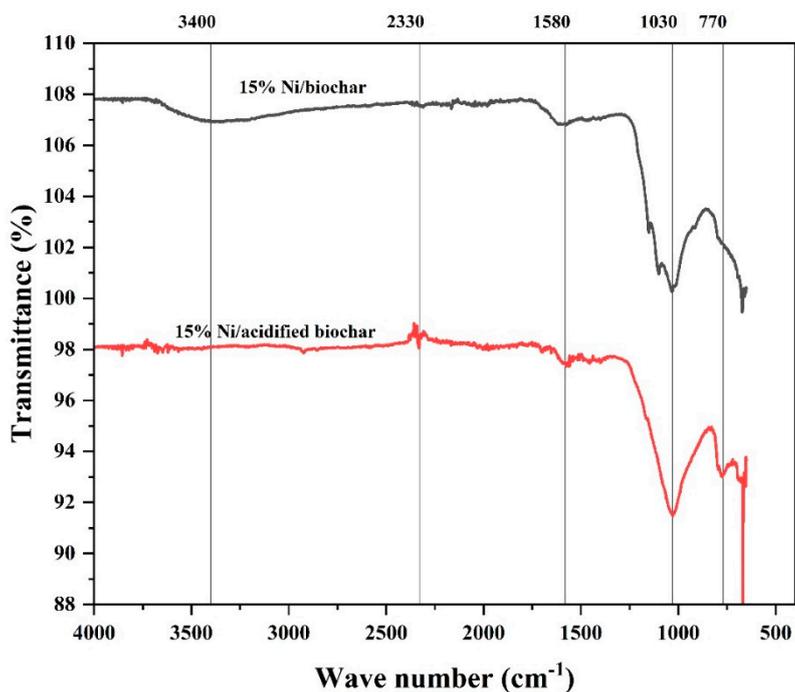


Figure S2. FT-IR spectra of biochar and biochar (H₂SO₄), and their corresponding Ni catalysts.

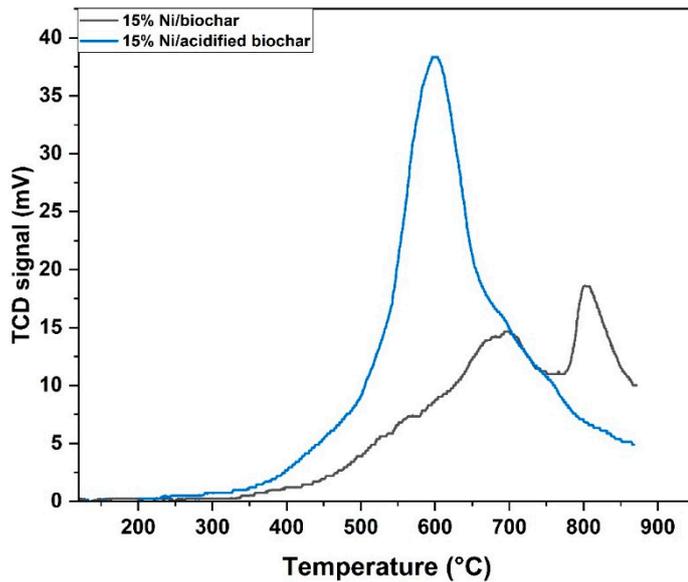


Figure S3. CO₂-TPD profile of raw Ni/biochar and sulfuric acid activated biochar Ni/BC catalysts.

References

Data in this Supplementary Information section have been reproduced from

1. Mudi, I.; Hart, A.; Ingram, A.; Wood, J. Catalytic hydrodeoxygenation of vanillin, a bio-oil model compound over renewable Ni/biochar catalyst. *Catalysts* **2023**, *13*, 171.