

Ultrafine Nickel Nanocatalyst-engineering Organic Layered Double Hydroxide towards Super-efficiently Fire-safe Epoxy Resin via Interfacial Catalysis

Zhi Li^{a,b}, Junhao Zhang^{a,c}, François Dufosse^a, De-Yi Wang^{a,b*}

^a *IMDEA Materials Institute, C/Eric Kandel, 2, 28906 Getafe, Madrid, Spain*

^b *Universidad Politécnica de Madrid, E.T.S. de Ingenieros de Caminos, 28040 Madrid, Spain*

^c *School of Environmental and Chemical Engineering, Jiangsu University of Science and Technology,*

Zhenjiang 212018, China

*Corresponding author. Tel: +34 917871888

Email address: deyi.wang@imdea.org

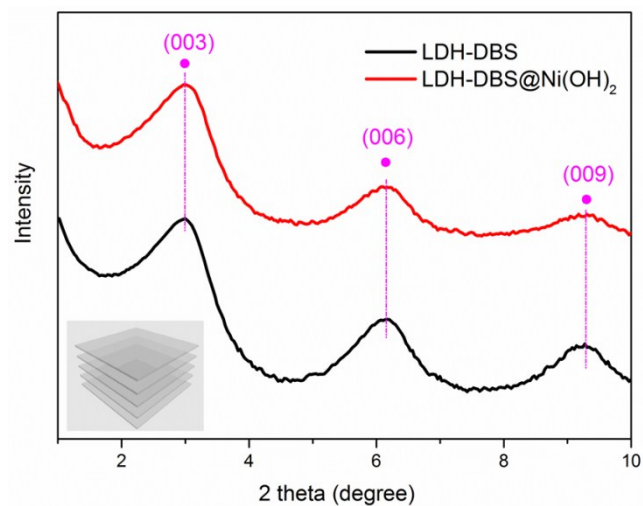


Fig S1 XRD spectra of LDH-DBS and LDH-DBS@Ni(OH)₂ at small angle

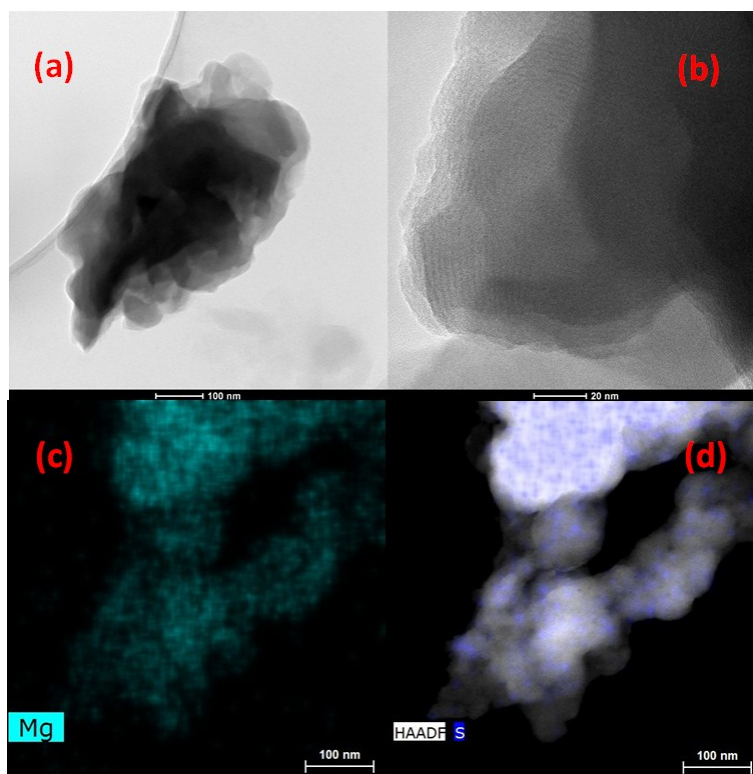


Fig S2 (a) and (b) TEM images of LDH-DBS at different magnification; (c) Mg mapping of LDH-DBS and (d) HAADF image with S mapping of LDH-DBS

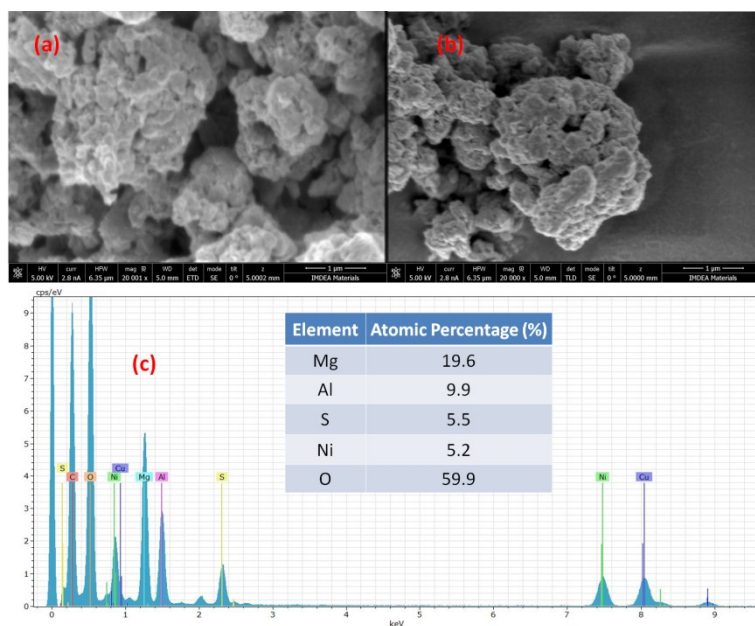


Fig S3 (a) and (b) SEM images of LDH-DBS and LDH-DBS@Ni(OH)₂; (c) EDS spectra with inset element percentage

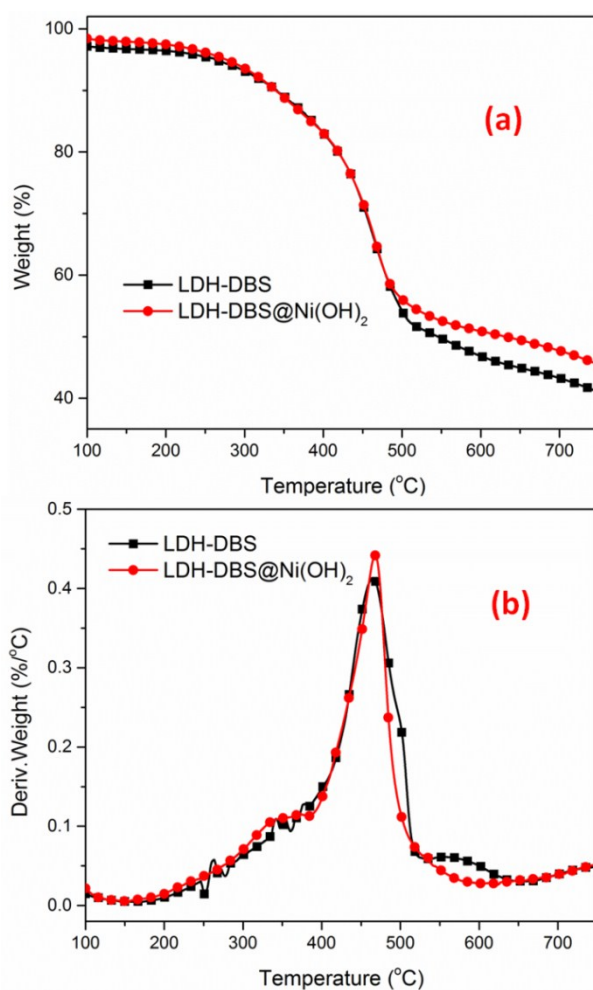


Fig S4 (a) TG and (b) DTG curves of LDH-DBS and LDH-DBS@Ni(OH)₂

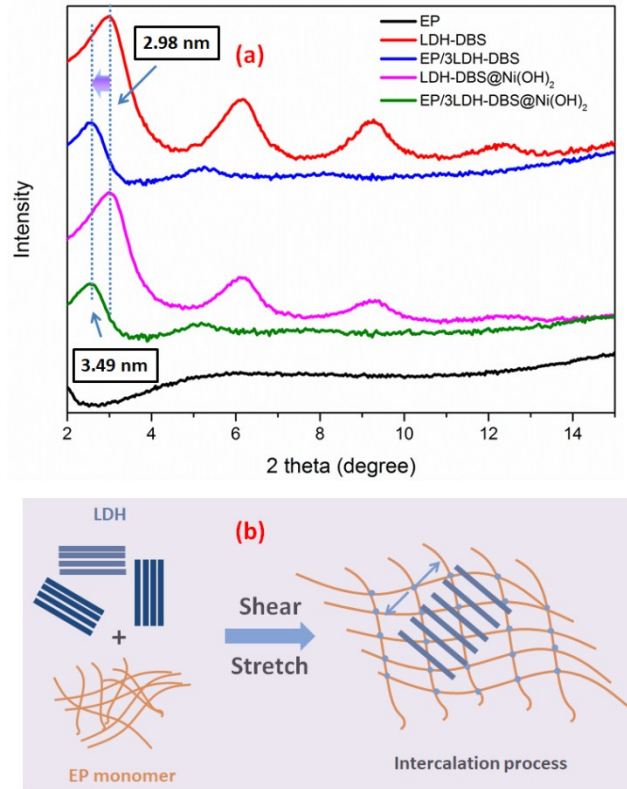


Fig S5 (a) XRD patterns of EP and EP nanocomposites; (b) schematic illustration of intercalation process

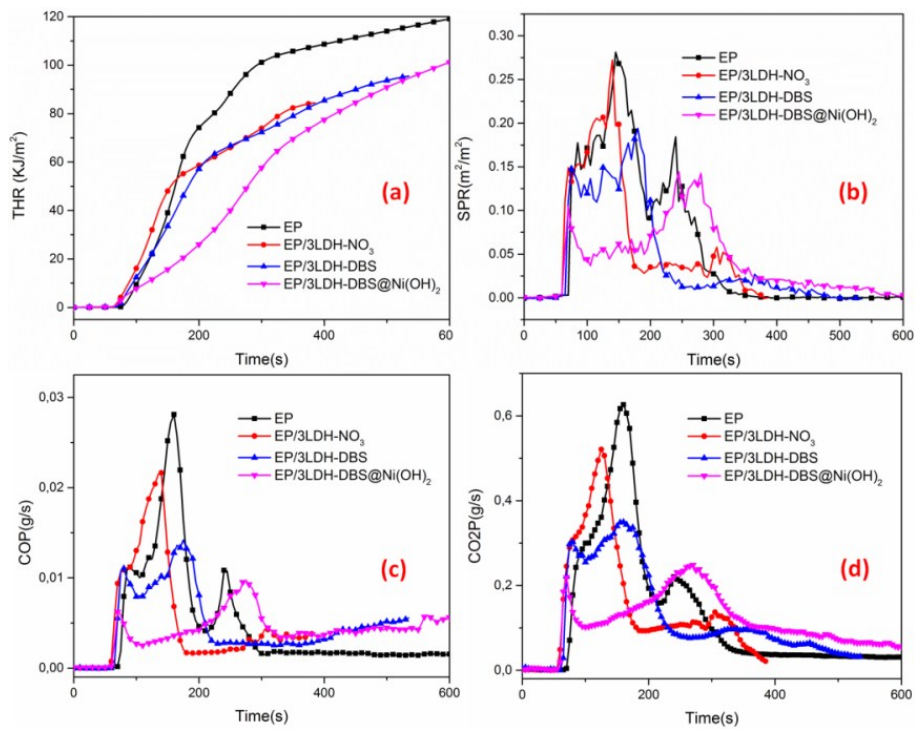


Fig S6 (a) THR; (b) SPR; (c) COP and (d) CO₂P profile of EP, EP/3LDH-NO₃, EP/3LDH-DBS and EP/3LDH-DBS@Ni(OH)₂

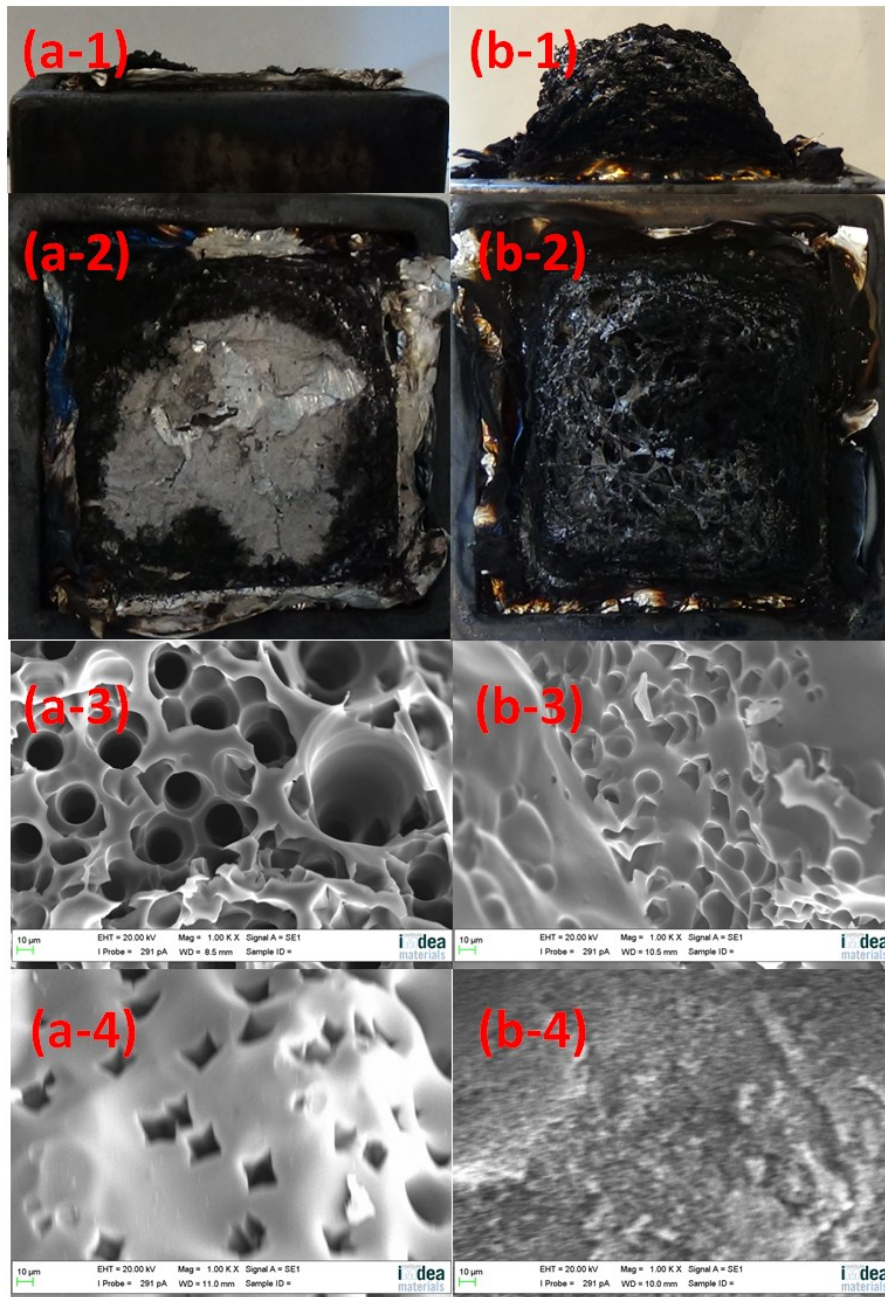


Fig S7 (a-1) front view and (a-2) top view of EP; (b-1) front view and (b-2) top view of EP/3LDH-NO₃; SEM images of (a-3) interior surface and (a-4) exterior surface of EP; SEM images of (b-3) interior surface and (b-4) exterior surface of EP/3LDH-NO₃

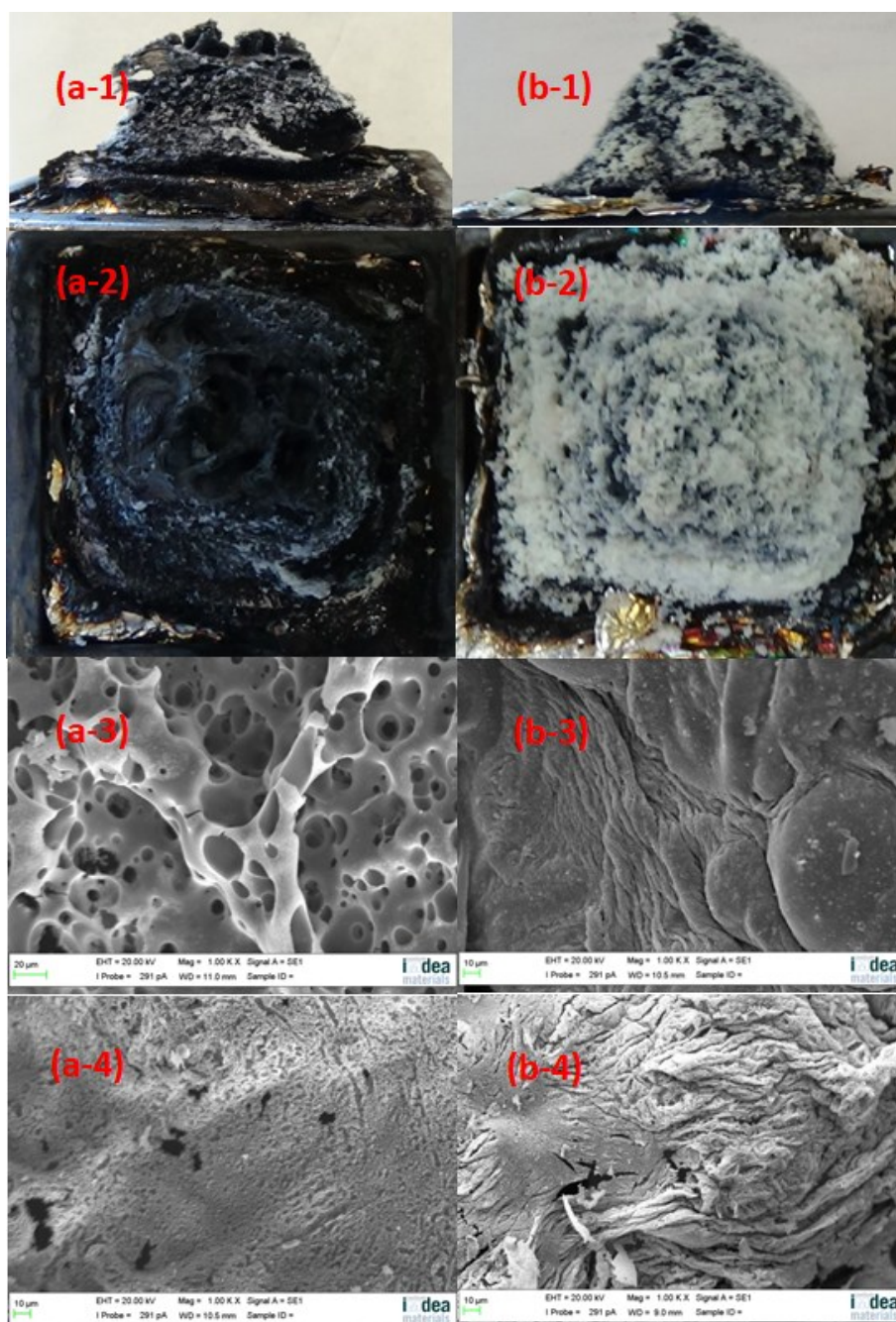


Fig S8 (a-1) front view and (a-2) top view of EP/3LDH-DBS; (b-1) front view and (b-2) top view of EP/3LDH-DBS@Ni(OH)₂; SEM images of (a-3) interior surface and (a-4) exterior surface of EP/3LDH-DBS; SEM images of (b-3) interior surface and (b-4) exterior surface of EP/3LDH-DBS@Ni(OH)₂

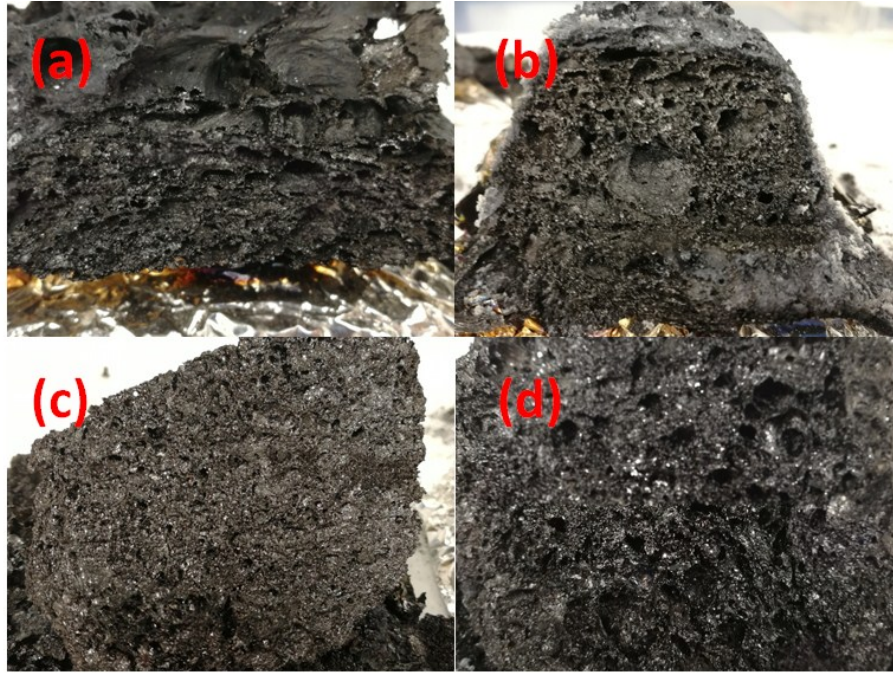


Fig S9 Vertical section of char from (a) EP/3LDH-DBS and (b) EP/3LDH-DBS@Ni(OH)₂; transverse section of char from (c) EP/3LDH-DBS and (d) EP/3LDH-DBS@Ni(OH)₂

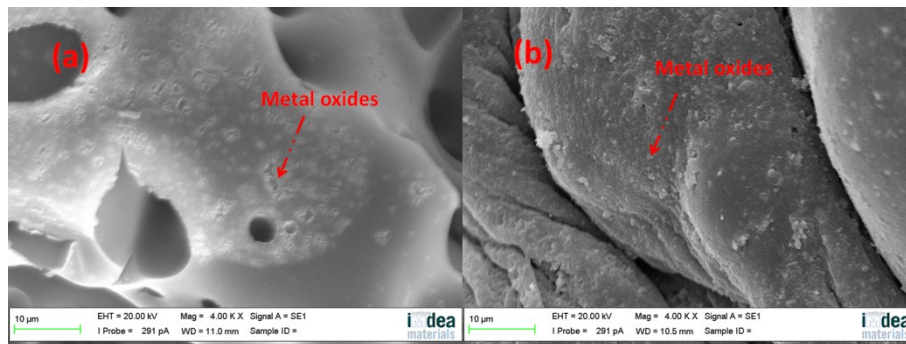


Fig S10 High-magnification SEM image of interior char from (a) EP/LDH-DBS and (b) EP/3LDH-DBS@Ni(OH)₂

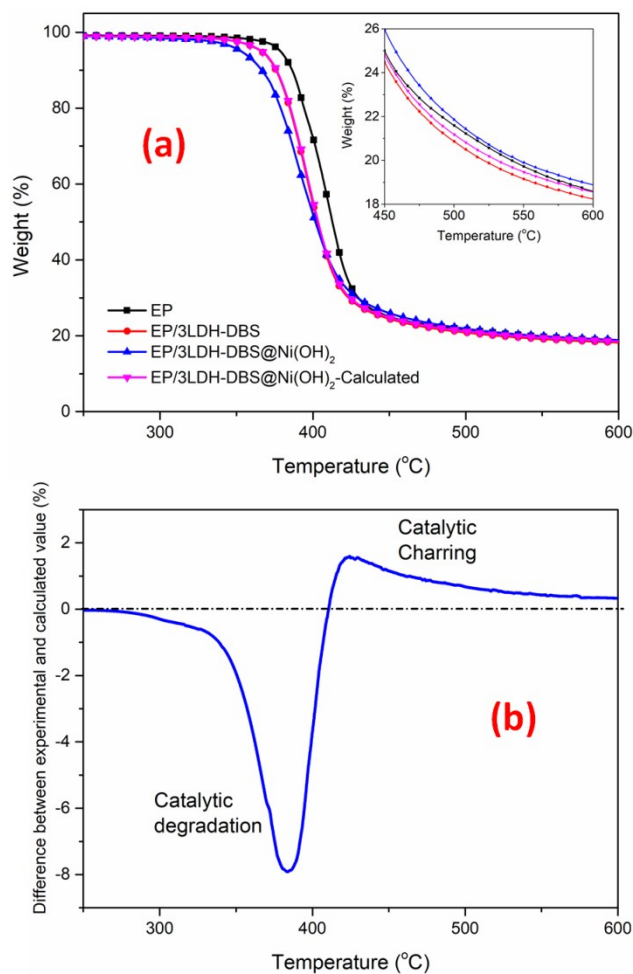


Fig S11 (a) TG curves of EP, EP/3LDH-DBS, EP/3LDH-DBS@Ni(OH)₂ and calculated EP/3LDH-DBS@Ni(OH)₂; (b) difference between experimental and calculated value

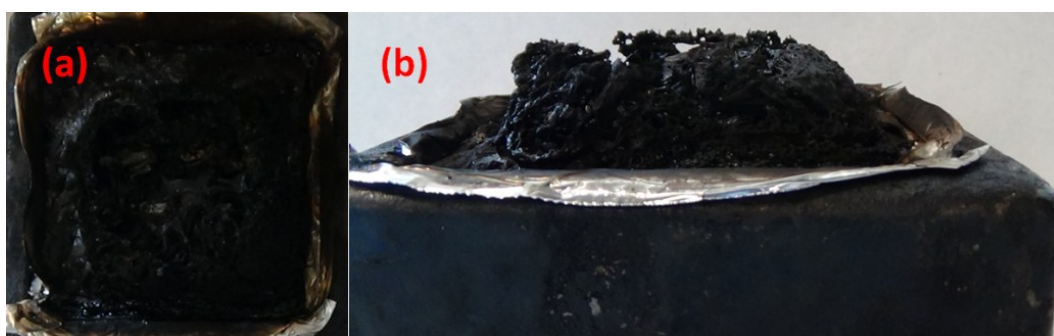


Fig S12 (a) top view and (b) front view of char from neat EP after CCT at 157s

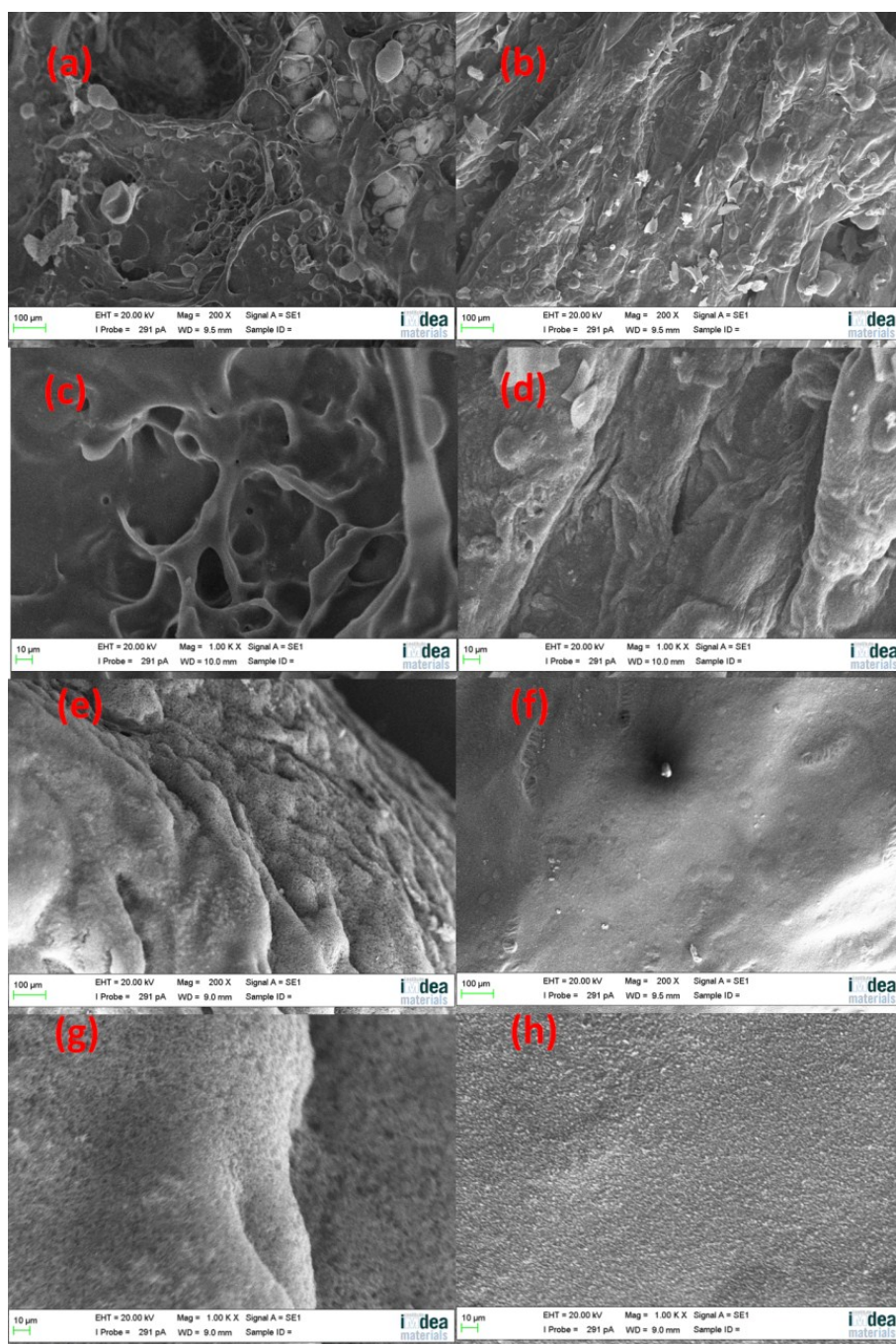


Fig S13 SEM images of interior surface of char from (a), (c) EP/3LDH-DBS and (b) (d) EP/3LDH-DBS@Ni(OH)₂; exterior surface of char from (e), (g) EP/3LDH-DBS and (f) (h) EP/3LDH-DBS@Ni(OH)₂

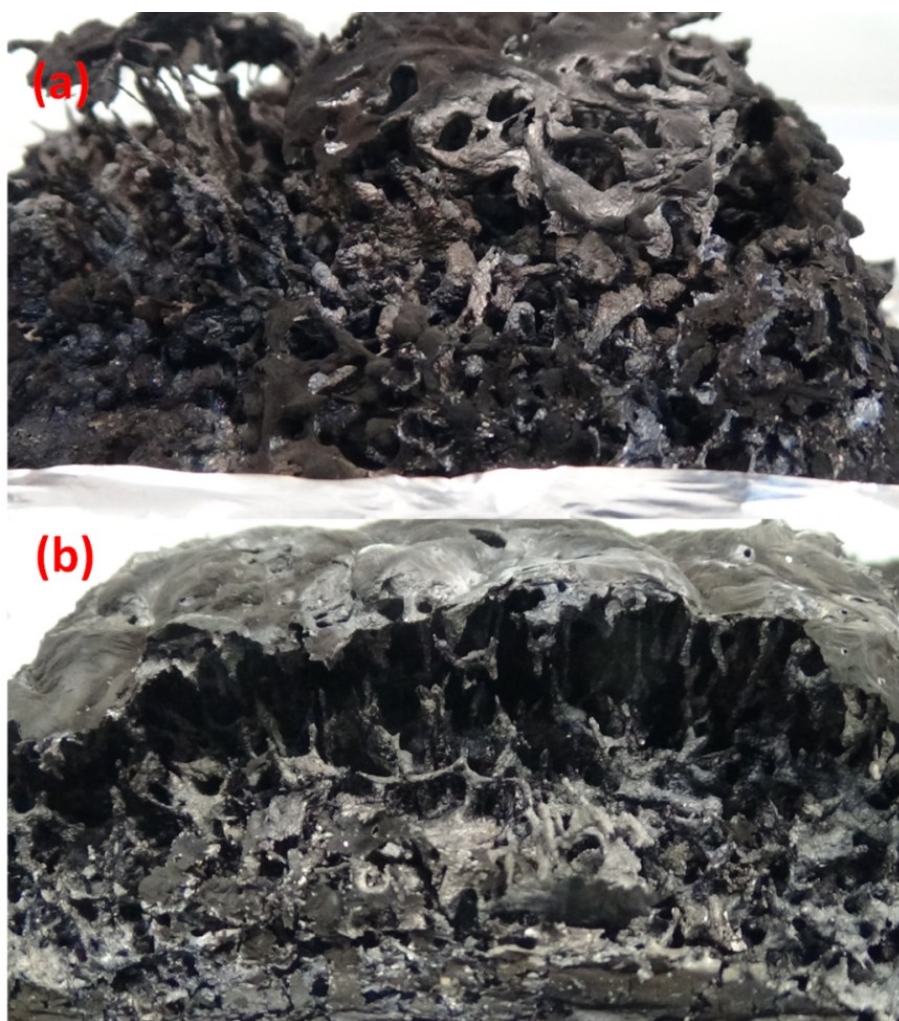


Fig S14 Digital images of vertical section of char in CCT at 157s of (a) EP/3LDH-DBS and EP/3LDH-DBS@Ni(OH)₂

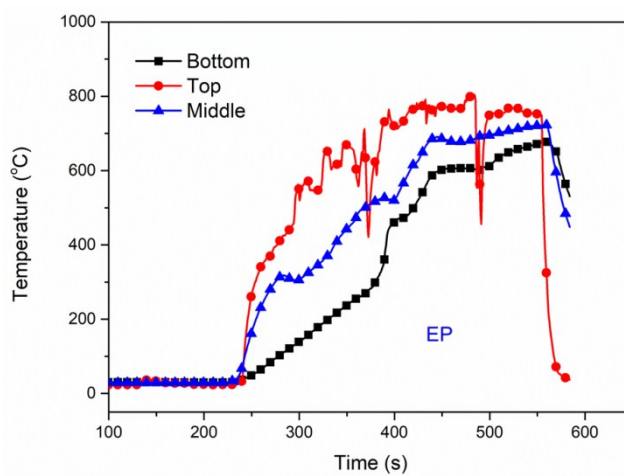


Fig S15 Top, middle and bottom temperatures of EP at CCT

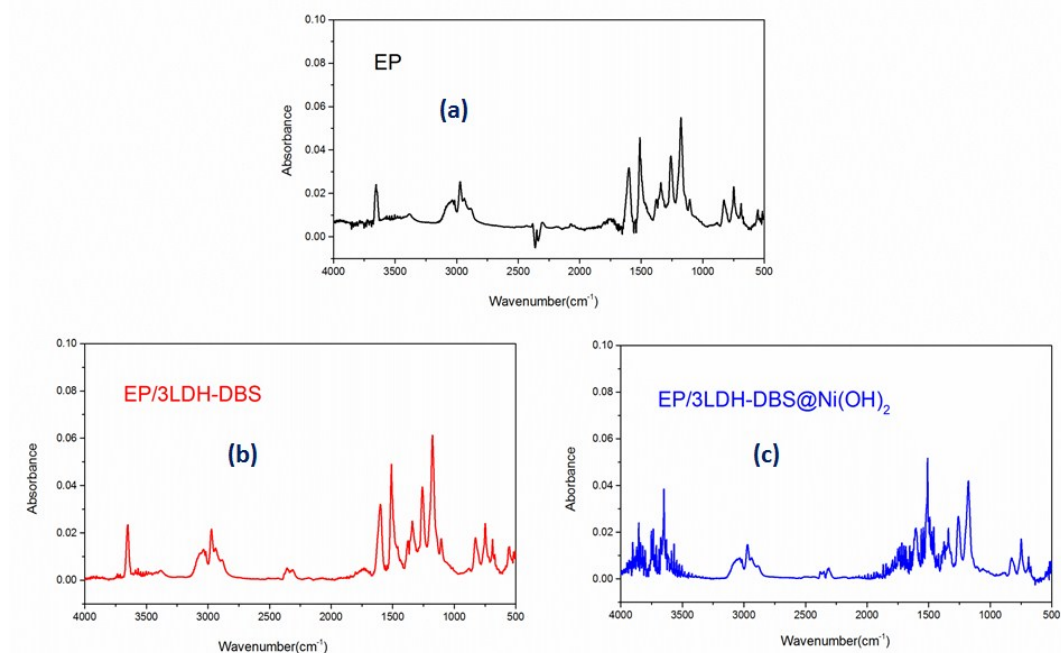


Fig S16 FTIR spectra of evolved volatiles at the maximum degradation rate of (a) EP, (b) EP/3LDH-DBS and (c) EP/3LDH-DBS@Ni(OH)₂

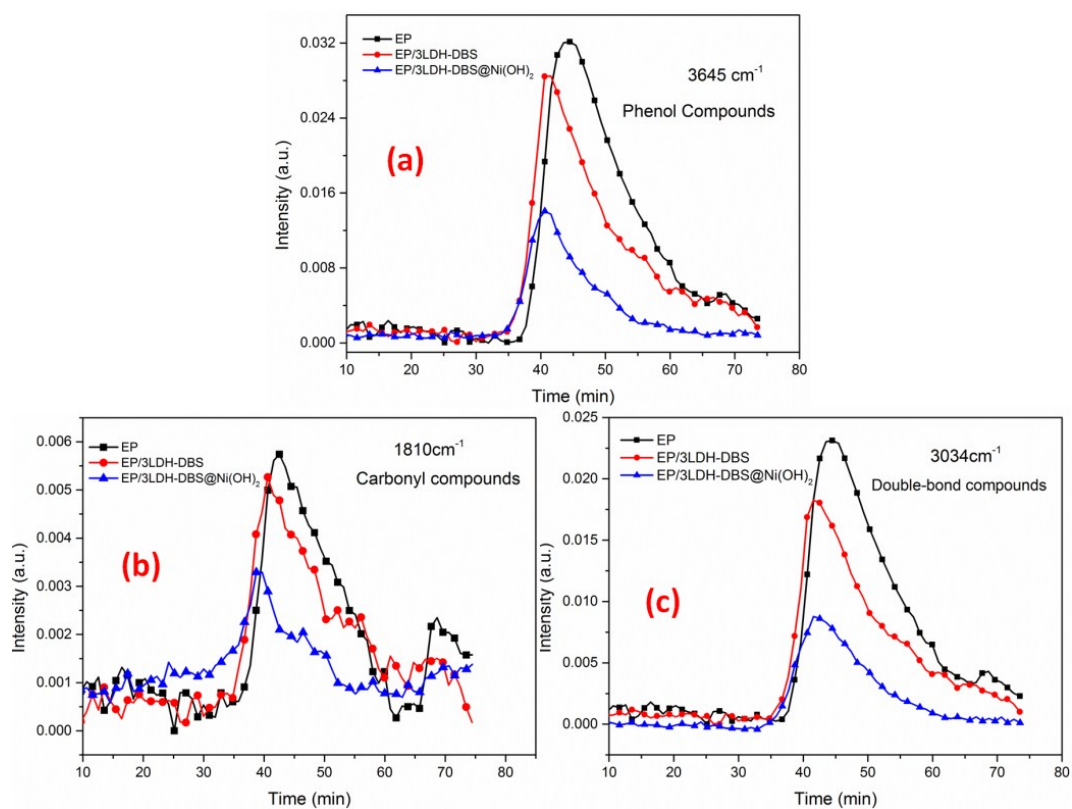


Fig S17 Evolution of (a) phenol compounds, (b) carbonyl compounds, (c) double-bond compounds

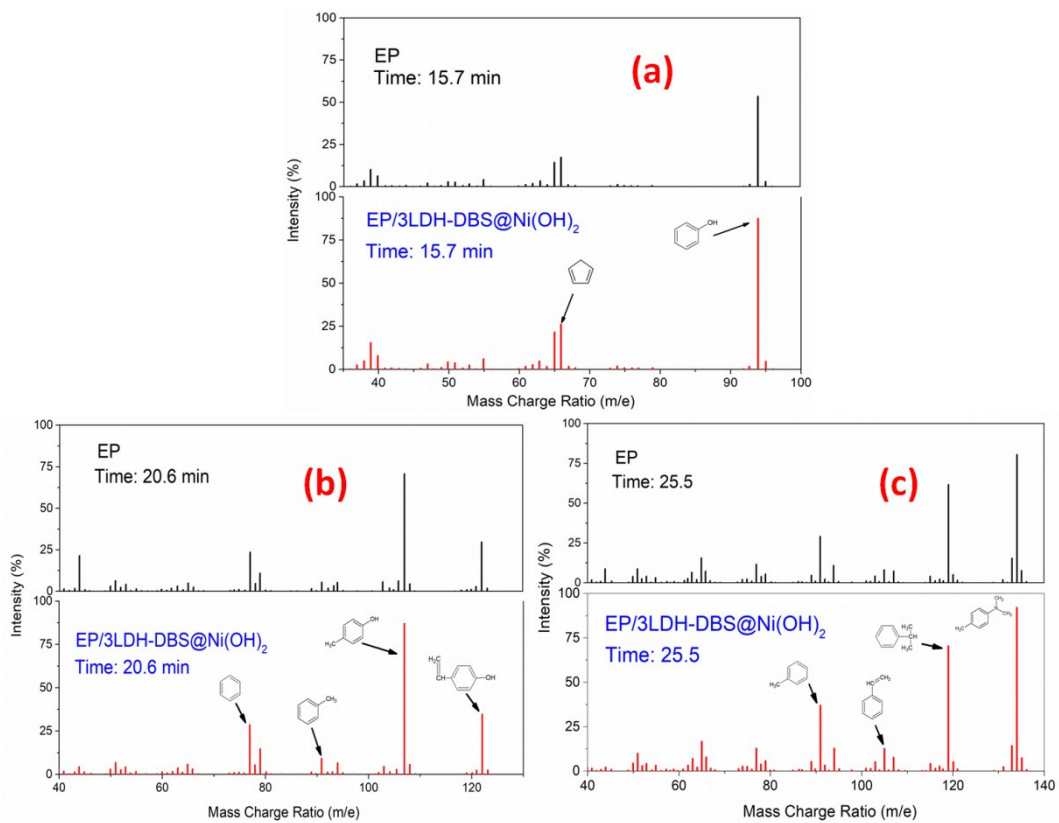


Fig S18 MS results of EP and EP/3LDH-DBS@Ni(OH)₂ at 15.7min

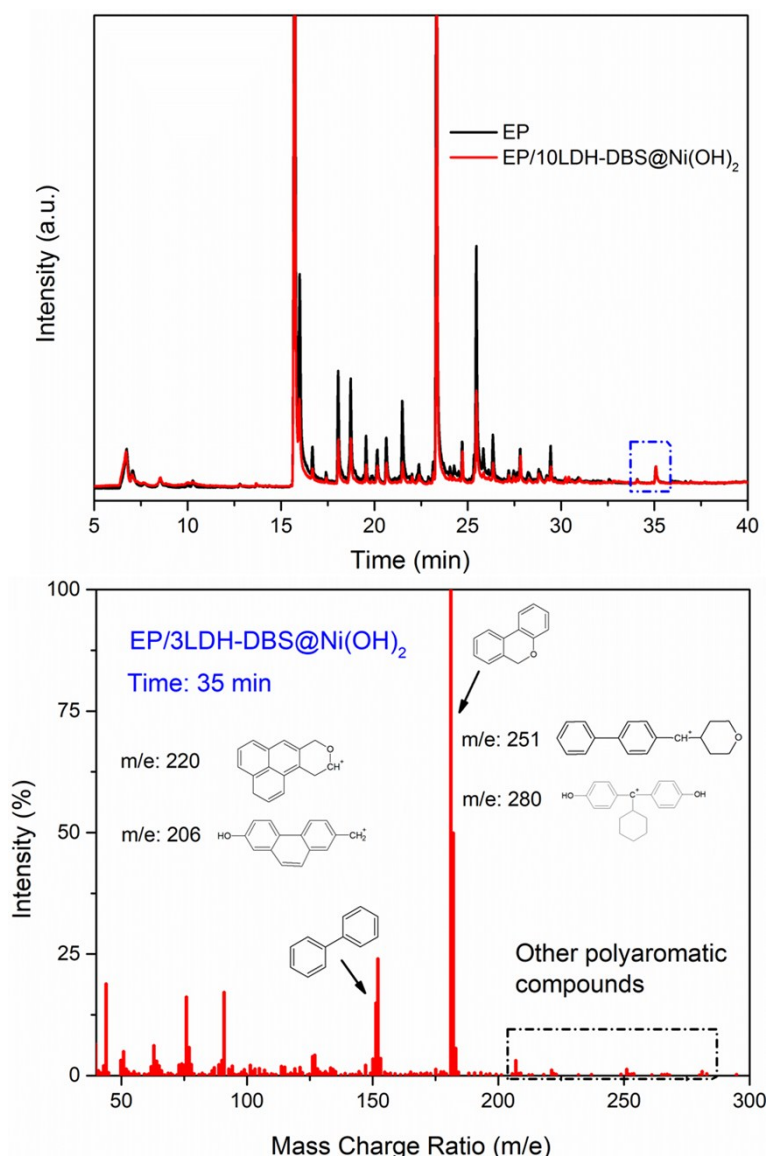


Fig S19 (a) GC results of EP and EP/10LDH-DBS@Ni(OH)₂; (b) MS results at 35min of EP/10LDH-DBS@Ni(OH)₂