SUPPLEMENTARY FILE (S1)

Table 1. FTIR peaks and the assignments of the samples PVDF—polyvinylidene fluoride, HC—hydroxyethyl cellulose, LG—Lignin, and CS—camphor soot, PHC—(HC – PVDF) composite, PCS— (CS PVDF) composite, and PLG— (LG–PVDF) composite.

Wave Number (cm^{-1})	**Peak assignments**	**Sample code**	**References**
599	CF_2 bending, α phase	PVDF	31
657	O=C-N stretching mode of DMF	PVDF, PHC	33
666-699	C–H deformation, polymer chain defects	CS, LG	31
736	ν (C==O) GO	CS, PCS	22,25
780	α phase	PLG	23
791	C_{60} and C_{70} coexist	CS	22
809	backbone of CNTs - ν (C==C)	CS	22,25
831-834	electroactive β phase (C-F stretching)	PVDF, PHC, PCS	21,33
837-840	Ar–CH out-of-plane deformation and β phase (C–F stretching)	LG, PLG	21,23,26,28
869	δ/γ (C–H)	CS	22,25

873	(C–C–C asymmetrical stretching vibration) combination of all three phases of PVDF, α phase	PVDF	23
874	C–H out of plane bending, α phase of PVDF	PHC	23
875	C–C–C asymmetrical stretching vibration	PCS	26
878	C–H out of plane bending, β-glucoside linkage	HC	29
1017	COH, CCH deformation vibration	HC	29
1022	COH, CCH deformation vibration	PHC	29
1023-1027	C–O(H) + C–O(Ar) stretching, phenolic OH + ether	PLG, LG	27
1030	C═O stretching vibrations in the anhydroglucose units of hydroxyethyl cellulose	PHC	28
1053	C═O stretching vibrations in the anhydroglucose units of hydroxyethyl cellulose	HC	26
1054	v (C–O) carboxyl or phenol groups	CS	22,25
1068	CH_3 rocking mode, α phase	PVDF, PCS	23,33
1096	CH_3 rocking mode	PHC	33
1125	Ar–CH in-plane deformation	PLG	28

1127	Ar–CH in-plane deformation	LG	28
1165	the combination of β and γ (C–C band)	PCS	21,24,26
1166	the combination of β and γ (C–C band)	PVDF	21,24,26
1171	the combination of β and γ (C–C band)	PHC	21,24,26
1214	C–O(H) + C–O(Ar) stretching, phenolic OH + ether	LG, PLG	28
1229-1235	γ phase	PCS, PVDF, PHC	24
1259	C–O stretching	PLG, LG	28
1265	ν (C–O)	CS	22,25
1351-1361	O-H deformation vibrations	HC, LG	28
1386	O–H in-plane deformation/ Phenolic OH and α phase	PLG	28,29
1389	attributed to CH_2 wagging vibration (a combination of all three phases of PVDF)	PHC	32
1402-1408	attributed to CH_2 wagging vibration, β phase, C-H deformation	PVDF, PCS, HC	23,26,29
1435	δas/γ (C–H)	CS	29
1449	C–C stretching Aromatic skeleton	LG	28
1453	HCH, OCH bending	HC	31
1504	aromatic skeleton C–C stretching	LG	28

1553-1562	Carbon skeletal vibrations of CNTs — ν(C==C)	PCS, CS	22,25
1564	symmetric vibration C=O groups in the polymer	HC	29
1583-1585	Conjugated C=O stretching	PLG, LG	28
1648-1676	C=O stretching mode	PLG, HC, PHC, PVDF, PCS	28,33
1900	ν (C==O) CNT–COOH	CS	25
2846-2849	C–H symmetrical stretching	PHC, PVDF	29
2851	CH stretching mode	PCS	33
2869	C–H symmetrical stretching	HC	32
2900	CH_3 and CH_2 Alkyl chain	CS	25,26,29
2917	CH_3 + CH_2 symmetric stretching vibration	PLG	28
2923-2925	CH_3 + CH_2 symmetric stretching vibration	PVDF, LG, PCS, PHC, PLG	28
2931	symmetric vibration of CH_2 groups	HC	26
3026	CH_2 asymmetric vibration	PVDF	26,31
3299	OH stretching	LG, PLG	29
3349-3365	CNTs, carboxylic, phenolic or hydroxyl groups	CS, PCS	22,25,29

3369-3397	stretching vibrations of the hydroxyl group	HC, PHC	26