

Burdock-Derived Composites Based on Biogenic Gold, Silver Chloride and Zinc Oxide Particles as Green Multifunctional Platforms for Biomedical Applications and Environmental Protection

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Table S1. FT-IR bands assignment for vegetal extract and phyto-synthesized materials.

Sample	FT-IR Bands (cm ⁻¹)	Assignment	Ref.
EB	3321 (broad, strong)	Normal "polymeric" OH stretch; bending and stretching vibrations of hydroxyl groups intermolecularly hydrogen bonded, in alcohols, polysaccharides and phenolic compounds/ polyphenols; Stretching vibrations of the primary and secondary amines	[1]
	2933 (weak)	C-H anti-symmetric stretching vibration	[2]
	2871 (weak)	C-H symmetrical stretch vibration of alkyl chains	[2]
	1608 (strong)	Amide I, arising due to carbonyl stretch in proteins; Carboxylate groups (-COO ⁻); Stretching C=C (aromatic ring); Primary amine, NH bend	[1]
	1407 (strong)	Phenol or tertiary alcohol, OH bend	[2]
	1260 (strong)	Primary or secondary, OH in-plane bend; Aromatic ethers, aryl-O stretch	[2]

		1108/ 1082 (strong)	Secondary alcohol, C–O stretch; Cyclic ethers, large rings, C–O stretch; Antisymmetric stretching of –C–O group of polysaccharides and/or chlorophyll; Secondary alcohol, C–O stretch; C-O bending in esters; –C–O–C– ether	[1] [2]
		767 (weak)	Aliphatic chloro compounds, C–Cl stretch	[2]
		613 (weak)	Alcohol, OH out-of-plane bend	[2]
AuNPs		3325 (broad, strong)	O–H stretching alcohols, polysaccharides and phenolic compounds/ polyphenols; Stretching vibrations of the primary and secondary amines	[1]
		2933 (weak)	C–H anti-symmetric stretching vibration	[2]
		2871 (weak)	C–H symmetrical stretch vibration of alkyl chains	[2]
		1617 (strong)	Amide I, arising due to carbonyl stretch in proteins Carboxylate groups (–COO–) Stretching C=C (aromatic ring) Primary amine, NH bend	[1]
		1399 (strong)	Carboxylates; Phenol or tertiary alcohol, OH bend	[2]
		1115 (strong)	Alkyl-substituted ether; Primary and secondary alcohol, C–O stretch	[2]
		1020 (weak)	Primary amine, C–N stretch; Aliphatic phosphates (P–O–C stretch)	[2]
		993	Aromatic phosphates (P–O–C stretch)	[2]
		828	C–O– stretch; Aromatic C–H out-of-plane bend	[2]
		767	Aliphatic chloro-compounds, C–Cl stretch	[2]
		618 (medium)	Alcohol, OH out-of-plane bend	[2]
	AgCINPs		3297	O–H stretching alcohols, polysaccharides and phenolic compounds/ polyphenols; Stretching vibrations of the primary and secondary amines
		2923	C–H anti-symmetric stretching vibration	[2]
		2848 (very weak)	C–H symmetrical stretch vibration of alkyl chains	[2]
		1595 (sharp, strong)	Amide I, arising due to carbonyl stretch in proteins; Carboxylate groups (–COO–) Stretching C=C (aromatic ring) Primary amine, NH bend	[1]
		1355 (sharp, strong)	Carboxylate (carboxylic acid salt) Primary or secondary, OH in-plane bend Phenol or tertiary alcohol, OH bend Amide III band in proteins	[1]
		1114 (sharp, strong)	Alkyl-substituted ether; Primary and secondary alcohol, C–O stretch	[2]
	618 (weak)	Alcohol, OH out-of-plane bend	[2]	
Zn O		3578-3018 (very	Very broad intense band overlapping the frequencies of the following groups: Phe-	[1]

	broad intense band)	nols, OH stretch; Hydrogen-bonded O–H (the bending and stretching vibrations of hydroxyl groups in alcohols, polysaccharides and phenolic compounds)	[2]
	2127 (weak, broad)	Transition metal carbonyls	[2]
	1580 (strong, narrow)	Amide I, arising due to carbonyl stretch in proteins Carboxylate groups (–COO [–]) Stretching C=C (aromatic ring) Primary amine, NH bend	[1]
	1395 (strong, narrow)	Carboxylates; Phenol or tertiary alcohol, OH bend; C–H bend	[2]
	1268 (strong, narrow)	Primary or secondary, OH in-plane bend; Aromatic ethers, aryl–O stretch	[2]
	1036 (medium)	Primary amine, CN stretch; Alkyl-substituted ether; Aliphatic phosphates (P–O–C stretch)	[2]
	907 (weak)	Aromatic phosphates (P–O–C stretch)	[2]
	545	Zn–O stretching vibration; hexagonal phase of ZnO	[3] [4]
AuZnO	3554-3034 (very broad, strong)	Very broad intense band overlapping the frequencies of the following groups: Nonbonded hydroxyl groups, Phenols, OH stretch; Hydrogen-bonded O–H (the bending and stretching vibrations of hydroxyl groups in alcohols, polysaccharides and phenolic compounds)	[1] [2]
	2976-2875 (weak, broad)	C–H anti-symmetric stretching vibration; C–H symmetrical stretch vibration of alkyl chains	[2]
	2127 (very weak)	Transition metal carbonyls C≡C stretch	[2]
	1585 (strong, sharp)	Amide I, arising due to carbonyl stretch in proteins Carboxylate groups (–COO [–]) Stretching C=C (aromatic ring) Primary amine, NH bend	[1] [2]
	1381 (strong, sharp)	Carboxylates; Phenol or tertiary alcohol, OH bend; C–H bend	[2]
	1034 (strong, sharp)	Primary amine, C–N stretch; Primary alcohol, C–O stretch Alkyl-substituted ether, C–O stretch	[2]
	907 (medium)	Aromatic phosphates (P–O–C stretch)	[2]
	750 (shoulder)	Aliphatic chloro compounds, C–Cl stretch	[2]
	708 (weak)	Aliphatic chloro compounds, C–Cl stretch Alcohol, OH out-of-plane bend	[2]
	694	Zn–O stretching vibration; hexagonal phase of ZnO	[3] [4]

AgClZnO	3605-2923 (very broad, strong)	Very broad intense band overlapping the frequencies of the following groups: Phenols, OH stretch; Hydrogen-bonded O-H (the bending and stretching vibrations of hydroxyl groups in alcohols, polysaccharides and phenolic compounds); C-H anti-symmetric stretching vibration	[1] [2]	
	2127 (weak, broad)	Transition metal carbonyls	[2]	
	1499 (strong)	Amide II band in proteins	[5]	
	1388 (strong)	Carboxylates; Phenol or tertiary alcohol, OH bend; C-H bend	[2]	
	1071 (very weak)- 1021	Primary amine, C-N stretch; Primary alcohol, C-O stretch; Alkyl-substituted ether, C-O stretch; Secondary alcohol, C-O stretch; Cyclic ethers, large rings, C-O stretch; Antisymmetric stretching of -C-O group of polysaccharides; Secondary alcohol, C-O stretch; C-O bending in esters; -C-O-C- ether	[1] [2]	
	734 (medium)	Aliphatic chloro compounds, C-Cl stretch	[2]	
	704 (very weak)	Aliphatic chloro compounds, C-Cl stretch; Disulfides (C-S stretch)	[2]	
	555 (weak)	Alcohol, OH out-of-plane bend	[2]	
AuAgClZnO	519	Zn-O stretching vibration; hexagonal phase of ZnO	[3] [4]	
	3604-2923 (very broad, strong)	Very broad intense band overlapping the frequencies of the following groups: Nonbonded hydroxyl groups, Phenols, OH stretch; Hydrogen-bonded O-H (the bending and stretching vibrations of hydroxyl groups in alcohols, polysaccharides and phenolic compounds); C-H anti-symmetric stretching vibration	[1] [2]	
		2132 (weak, broad)	Transition metal carbonyls	[2]
		1790 (very weak)	Amide I, arising due to carbonyl stretch in proteins Carboxylate groups (-COO-)	[2] [6]
		1595, broad weak	Amide I, arising due to carbonyl stretch in proteins Carboxylate groups (-COO-) Stretching C=C (aromatic ring) Primary amine, NH bend	[1] [2]
			1379, (broad, medium)	Carboxylates; Phenol or tertiary alcohol, OH bend; C-H bend

1075-1025 (weak bands)	Primary amine, C–N stretch; Primary alcohol, C–O stretch; Alkyl-substituted ether, C–O stretch; Secondary alcohol, C–O stretch; Cyclic ethers, large rings, C–O stretch; Antisymmetric stretching of –C–O group of polysaccharides; Secondary alcohol, C–O stretch; C–O bending in esters; –C–O–C– ether	[1] [2]
798; 735; 697 (very weak)	Aliphatic chloro compounds, C–Cl stretch	[2]
559 (very weak)	Zn–O stretching vibration; hexagonal phase of ZnO	[3] [4]

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