



Figure S1. Real images of bacterial cellulose production and biocomposites.

Table S1. Data regarding the physical properties, barrier, and mechanical properties of pure bacterial cellulose (sample F1) and bacterial cellulose–collagen–starch biocomposites (samples F2-F9).

Analysis	Sample Name								
	F1	F2	F3	F4	F5	F6	F7	F8	F9
Water activity	0.48 ^a ±0.01	0.44 ^b ±0.06	0.45 ^b ± 0.01	0.45 ^b ± 0.02	0.40 ^c ± 0.01	0.48 ^a ± 0.01	0.48 ^a ± 0.01	0.42 ^c ± 0.01	0.42 ^c ± 0.01
Moisture (%)	10.88 ^c ±0.64	19.34 ^a ±1.64	13.06 ^{bc} ±1.67	13.69 ^{bc} ±1.05	13.37 ^{bc} ±0.88	20.60 ^a ±0.69	15.66 ^b ±0.04	11.19 ^c ±0.81	10.75 ^c ±0.89
Total solids (%)	89.12 ^a ±0.64	80.66 ^c ±1.64	86.94 ^{ab} ±1.67	86.31 ^{ab} ±1.05	86.63 ^{ab} ±0.88	79.4 ^c ±0.69	84.34 ^b ±0.04	88.81 ^a ±0.81	89.25 ^a ±0.89
Water solubility (%)	12.94 ^e ±2.58	27.11 ^d ±6.52	31.12 ^{cd} ±2.31	36.76 ^{cd} ±1.62	41.79 ^{bc} ±2.02	52.33 ^b ±1.74	69.67 ^a ±12.7	54.12 ^b ±2.21	69.76 ^a ±1.43
Water vapor permeability (10 ⁻⁸ g.mm/m ² .h.Pa)	5.59 ^e ±0.44	10.01 ^d ±0.51	10.18 ^d ±0.38	10.89 ^{cd} ±0.33	10.19 ^d ±0.57	11.94 ^{bcd} ±0.61	13.37 ^{ab} ±1.52	12.66 ^{abc} ±0.45	14.06 ^a ±0.71
Opacity (Abs 600nm. mm ⁻¹)	36.67 ^a ±0.37	9.49 ^{ef} ±0.12	8.82 ^f ±0.04	11.12 ^d ±0.05	12.03 ^d ±0.64	31.85 ^b ±1.98	16.02 ^c ±0.52	8.37 ^f ±0.08	9.17 ^{ef} ±0.81
Grammage (g.cm ⁻²)	8.91 ^e ±0.46	17.57 ^d ±0.21	10.25 ^e ±0.19	39.58 ^a ±0.87	26.25 ^c ±0.84	16.41 ^d ±0.69	24.66 ^c ±3.97	39.10 ^a ±0.73	33.11 ^b ±0.52
Thickness (mm)	0.04 ^d ±0.10	0.08 ^c ±0.01	0.09 ^{bc} ±0.01	0.10 ^b ±0.02	0.08 ^c ±0.01	0.08 ^c ±0.01	0.09 ^c ±0.02	0.11 ^a ±0.03	0.10 ^b ±0.01
Elongation (%)	169.54 ^a ±6.00	20.29 ^{bc} ±6.35	21.39 ^b ±5.76	16.07 ^{bcd} ±5.04	4.81 ^d ±2.0	14.29 ^{bcd} ±3.22	8.61 ^{cd} ±1.67	10.55 ^{bcd} ±1.75	5.57 ^d ±1.94
Tensile strength (Mpa)	0.99 ^e ±0.23	8.7 ^b ±2.74	4.17 ^{cd} ±1.23	9.05 ^b ±0.75	6.72 ^{bc} ±1.22	1.5 ^{de} ±0.76	1.8 ^{de} ±0.15	16.32 ^a ±1.04	5.21 ^c ±1.31

Table S2. Main values related to thermogravimetric analysis of pure bacterial cellulose (sample F1) and bacterial cellulose–collagen–starch biocomposites (samples F2–F9).

Sample name	Temperature range (°C)	Weight loss range (%)
F1	29.58 – 250.03	0 – 6.93
	250.03 – 350.92	6.93 – 60.02
	350.92 – 791.26	60.02 – 78.84
F2	26.55 – 246.98	0 – 23.56
	246.98 – 347.90	23.56 – 71.72
	347.90 – 788.22	71.72 – 80.59
F3	29.09 – 249.51	0 – 27.62
	249.51 – 350.41	27.62 – 73.77
	350.41 – 790.73	73.77 – 87.77
F4	23.55 – 244.29	0 – 17.62
	244.29 – 345.05	17.62 – 64.66
	345.05 – 785.42	64.66 – 83.51
F5	26.46 – 250.31	0 – 21.25
	250.31 – 351.20	21.25 – 72.24
	351.20 – 791.35	72.24 – 87.21
F6	24.19 – 247.28	0 – 30.31
	247.28 – 348.02	30.31 – 66.66
	348.02 – 788.14	66.66 – 85.28
F7	28.15 – 244.91	0 – 20.53
	244.91 – 345.80	20.53 – 59.71
	345.80 - 785.91	59.71 – 82.8
F8	25.06 – 248.78	0 – 16.13
	248.78 – 349.66	16.13 - 63.60
	349.66 – 789.80	63.60 – 80.61
F9	29.58 – 245.75	0 – 19.74
	245.75 – 346.63	19.74 – 62.31
	346.63 – 786.83	62.31 – 85.24