

Supporting Information

Properties and Degradation Performances of Biodegradable Poly(lactic acid)/poly(3-hydroxybutyrate) Blends and Keratin Composites.

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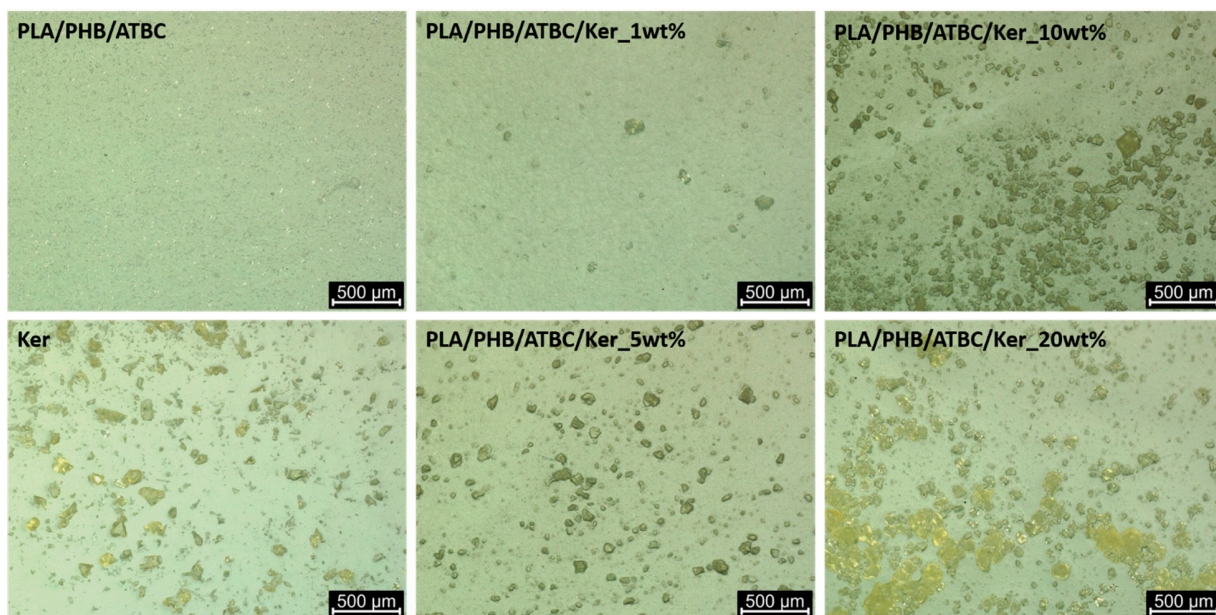


Figure S1: Optical microscopy pictures of PLA/PHB/ATBC neat polymer matrix, keratin filler and PLA/PHB/ATBC/keratin composites with 1, 5, 10 and 20 wt% of keratin filler content at $150\times$ magnification.

Table S1: Molecular characteristics of PLA/PHB, PLA/PHB/ATBC neat matrices and composites with varying keratin content from 1 to 20 wt%.

Sample	Casted		Compression-molded	
	as prepared $M_n, M_w, Đ$ $g\ mol^{-1}$	treated 80°C, 16 h $M_n, M_w, Đ$ $g\ mol^{-1}$	as prepared $M_n, M_w, Đ$ $g\ mol^{-1}$	treated 80°C, 16 h $M_n, M_w, Đ$ $g\ mol^{-1}$
PLA/PHB	47 100, 100 500 2.13	51 200, 115 000 2.25	44 200, 93 800 2.11	43 700, 91 800 2.10
PLA/PHB/ATBC	45 700, 93 400 2.05	45 400, 93 100 2.05	43 200, 92 000 2.11	43 600, 90 100 2.07
PLA/PHB/ATBC/ K-1wt%	42 700, 89 600 2.10	45 400, 89 300 1.97	43 200, 83 000 1.91	42 500, 88 300 2.08
PLA/PHB/ATBC/ K-3wt%	43 700, 86 100 1.97	44 000, 89 400 2.03	37 300, 82 400 2.21	39 800, 90 100 2.26
PLA/PHB/ATBC/ K-5wt%	41 100, 88 200 2.15	38 500, 82 300 2.14	34 300, 82 800 2.41	38 200, 82 600 2.16
PLA/PHB/ATBC/ K-10wt%	36 100, 72 200 2.00	37 800, 80 300 2.12	33 200, 79 800 2.40	35 900, 83 000 2.31
PLA/PHB/ATBC/ K-20wt%	31 500, 66 000 2.09	32 900, 76 900 2.34	28 300, 64 200 2.27	27 000, 64 800 2.40

Table S2: Parameters obtained from DSC records of PLA/PHB and PLA/PHB/ATBC neat foils and keratin composites with varying keratin content from 1 to 20 wt% prepared by compression-molding procedure.

Sample	T_g (°C)	T_{cc} (°C)	T_m (°C)	ΔH_{m1} (J g ⁻¹)	ΔH_{m2} (J g ⁻¹)	χ_c (%)
PLA/PHB	51.3	121.5	149.1/170.7	36.25	33.46	35.88
PLA/PHB/ATBC	32.4	99.3	148.2/167.6	34.53	31.46	34.18
PLA/PHB/ATBC/K-1	30.1	103.0	141.2/167.0	33.17	33.65	32.83
PLA/PHB/ATBC/K-3	29.3	96.9	147.5/165.9	38.55	38.33	38.16
PLA/PHB/ATBC/K-5	30.9	98.1	147.7/166.7	35.17	33.63	34.81
PLA/PHB/ATBC/K-10	30.7	97.5	147.7/166.3	34.65	37.66	34.30
PLA/PHB/ATBC/K-20	26.5	93.2	146.7/165.1	31.53	35.32	31.21

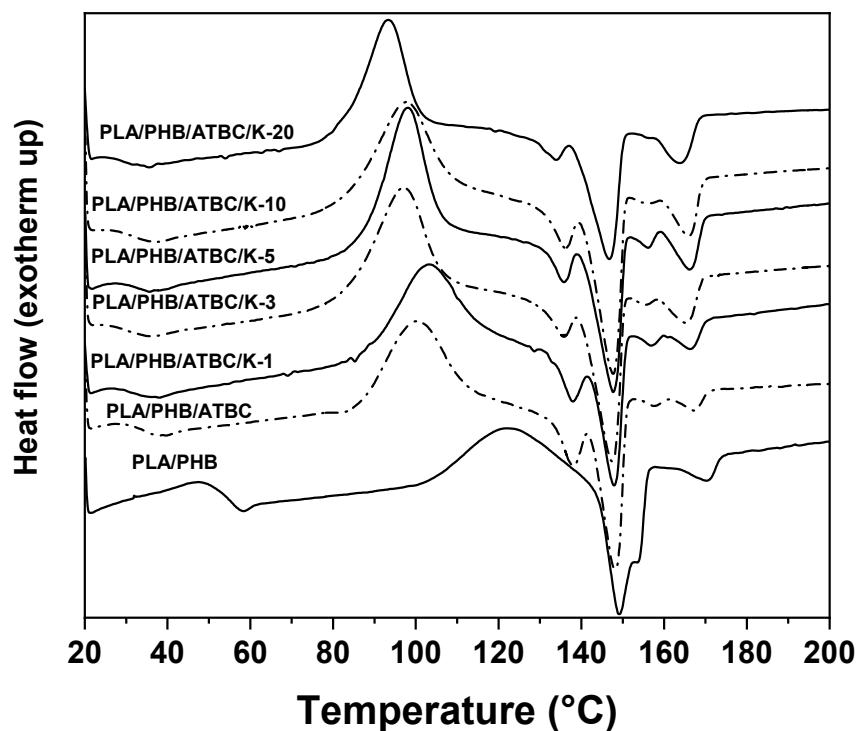


Figure S2: DSC second heating run of PLA/PHB and PLA/PHB/ATBC neat foils and keratin composites with varying keratin content from 1 to 20 wt% prepared by compression-molding procedure.

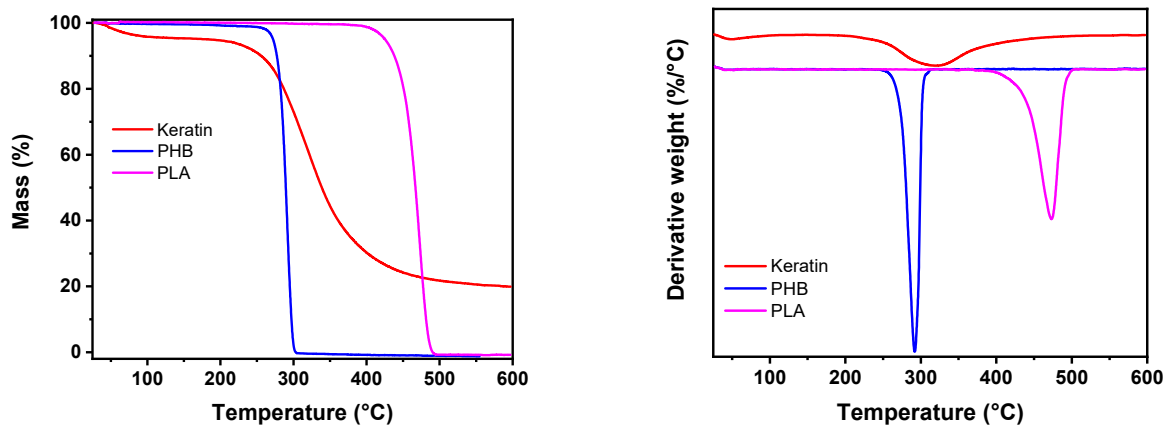


Figure S3: TGA and DTG curves of PLA, PHB and keratin bare materials.

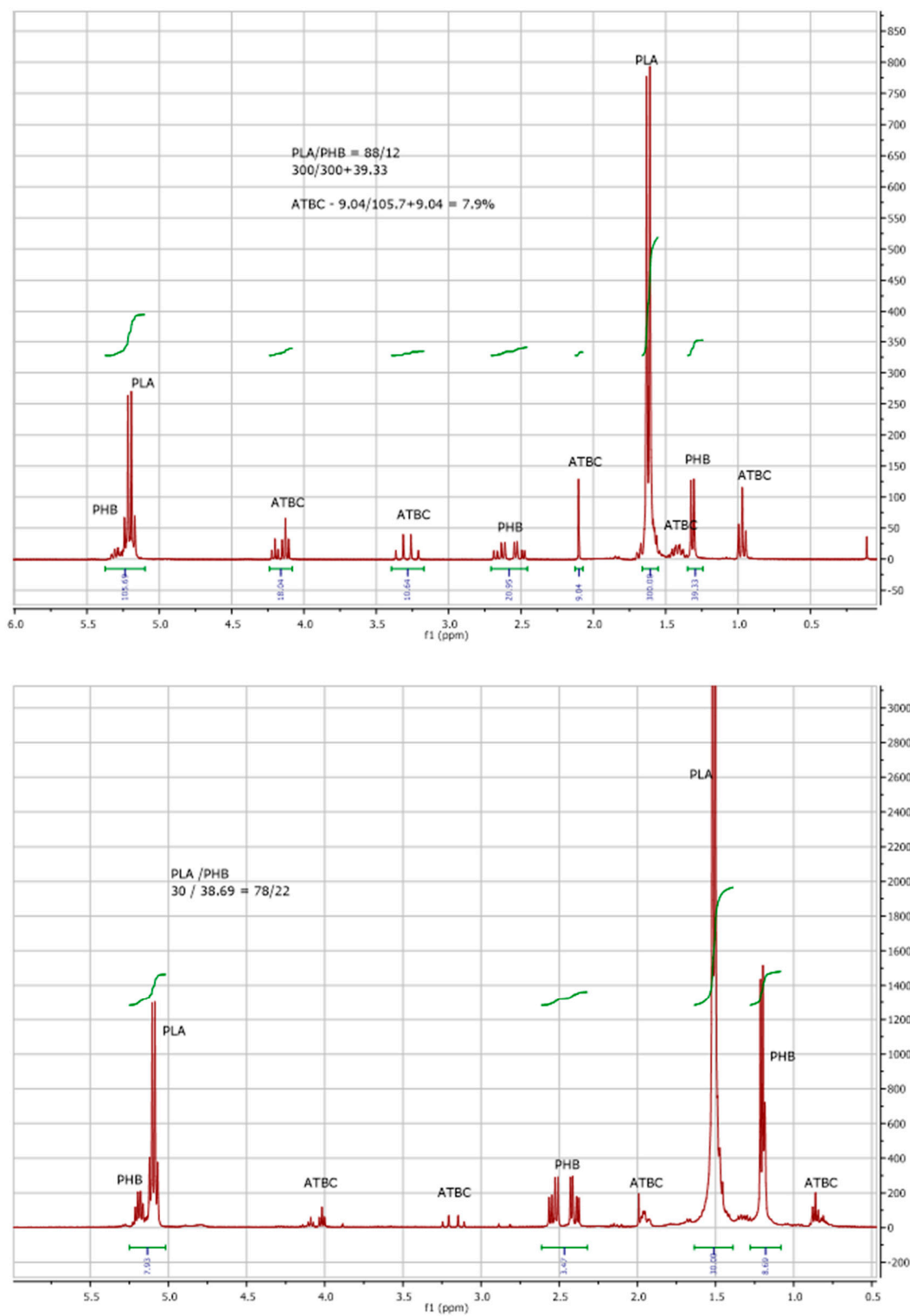


Figure S4: ^1H NMR spectra of of PLA/PHB/ATBC/K-5 composite with 5 wt% of keratin in matrix before (upper) and after hydrolysis in 0.01 M NaOH (36 days, 78% extractable products) (down).

Table S3: Parameters obtained from DSC records of PLA/PHB/ATBC neat foil and keratin composites with varying keratin content from 5 to 20 wt% at the end of hydrolysis.

Sample	T_g (°C)	T_m (°C)	ΔH_{m1} (J g ⁻¹)	χ_c (%)
PLA/PHB/ATBC	54.9	149.6/164.3	34.53	49.31
PLA/PHB/ATBC/K-5	52.6	150.1/165.6	49.82	50.11
PLA/PHB/ATBC/K-10	52.5	150.2/163.5	50.63	47.63
PLA/PHB/ATBC/K-20	51.6	148.9/161.6	48.12	36.80

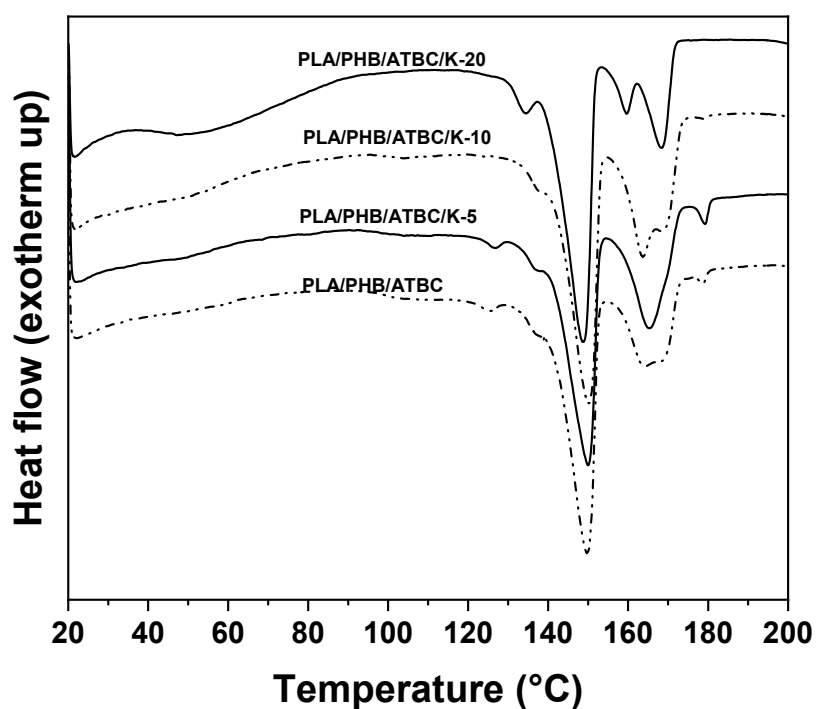


Figure S5: DSC second heating run of PLA/PHB/ATBC neat foil and keratin composites with varying keratin content from 5 to 20 wt% at the end of hydrolysis.

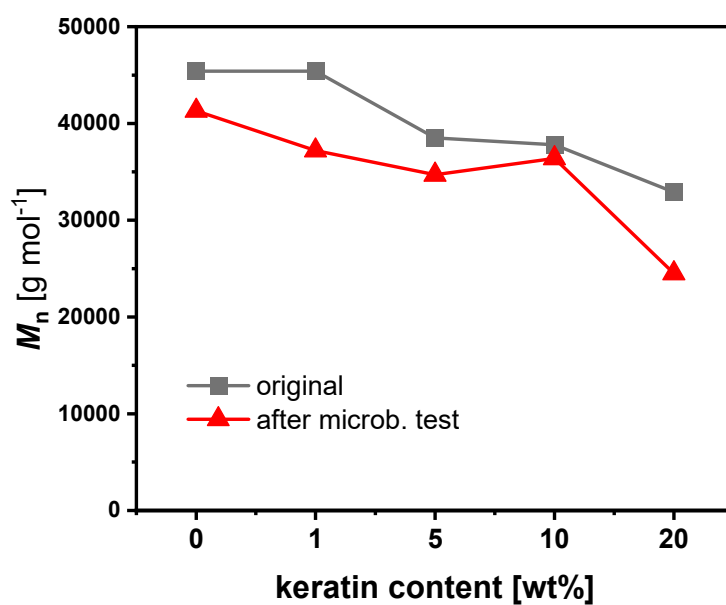


Figure S6: Average number molar masses of PLA/PHB/ATBC blend and its composites with varying keratin content from 1 to 20 wt% before and after the 1 month microbial test.