

Article

Supplementary Materials: (Bio)Degradable Polymeric Materials for Sustainable Future—Part 3: Degradation Studies of the PHA/Wood Flour-Based Composites and Preliminary Tests of Antimicrobial Activity

Marta Musioł ^{1,*}, Sebastian Jurczyk ², Michał Sobota ¹, Magdalena Klim ^{1,3}, Wanda Sikorska ¹, Magdalena Zięba ¹, Henryk Janeczek ¹, Joanna Rydz ¹, Piotr Kurcok ¹, Brian Johnston ⁴, and Izabela Radecka ⁴

¹ Centre of Polymer and Carbon Materials, Polish Academy of Sciences, 34. M. Curie-Sklodowska St., 41-819 Zabrze, Poland; msobota@cmpw-pan.edu.pl (M.S.); klim.magdalena@gmail.com (M.K.); wsikorska@cmpw-pan.edu.pl (W.S.); mzieba@cmpw-pan.edu.pl (M.Z.); hjaneczek@cmpw-pan.edu.pl (H.J.); jrydz@cmpw-pan.edu.pl (J.R.); pkurcok@cmpw-pan.edu.pl (P.K.);

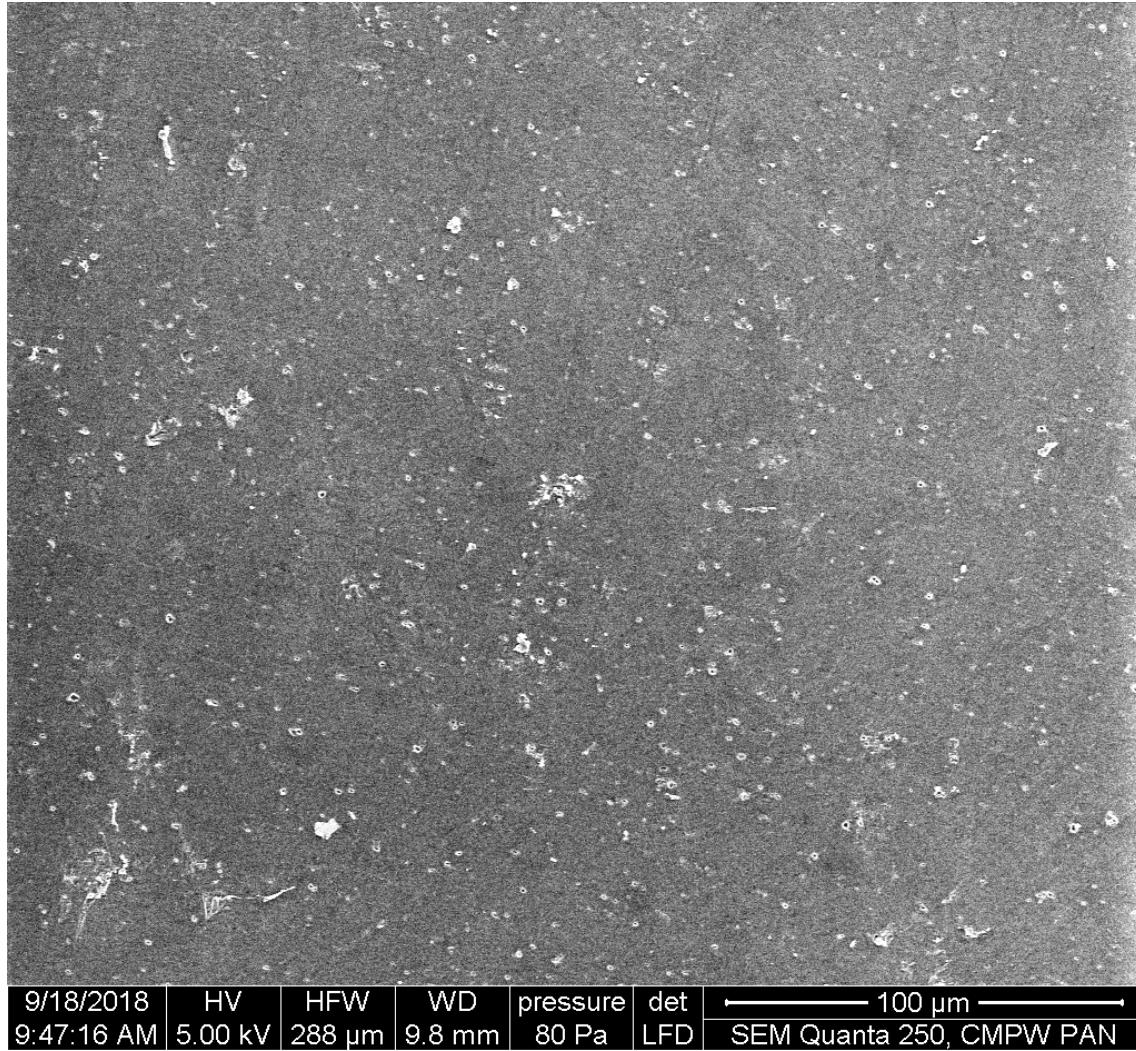
² Łukasiewicz Research Network – Institute for Engineering of Polymer Materials and Dyes, 55, M. Skłodowska-Curie St., 87-100 Toruń, Poland; s.jurczyk@impib.pl

³ Department of Microbiology and Virology, School of Pharmacy with the Division of Laboratory Medicine, Medical University of Silesia, 4 Jagiellońska St., 41-200 Sosnowiec, Poland

⁴ Wolverhampton School of Sciences, Faculty of Science and Engineering, University of Wolverhampton, Wulfruna Street, Wolverhampton, WV1 1LY, UK; B.Johnston@wlv.ac.uk (B.J.); I.Radecka@wlv.ac.uk (I.R.)

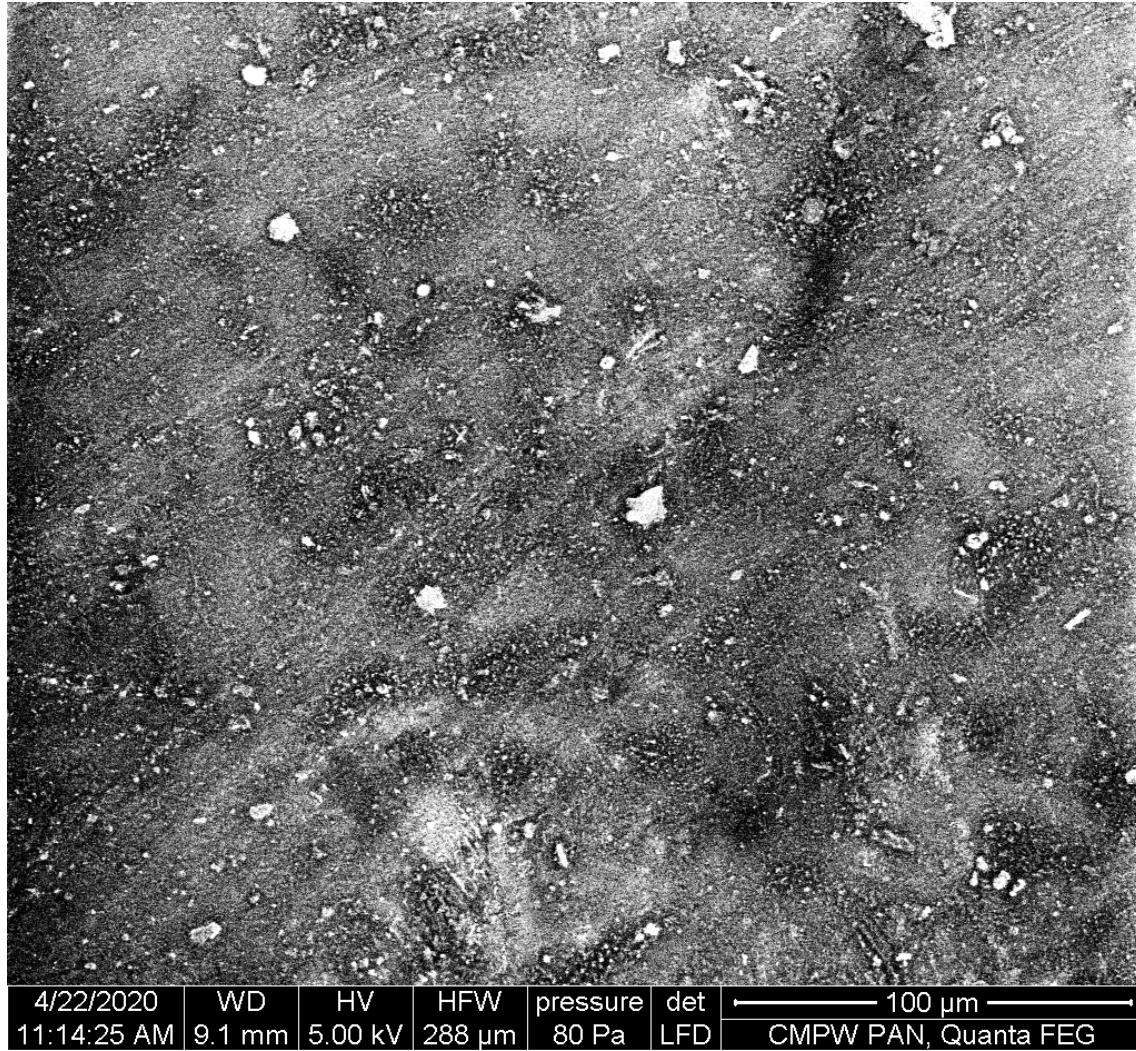
* Correspondence: mmusiol@cmpw-pan.edu.pl; Tel.: +48-322-716-077

Received: 15 April 2020; Accepted: 8 May 2020; Published: date



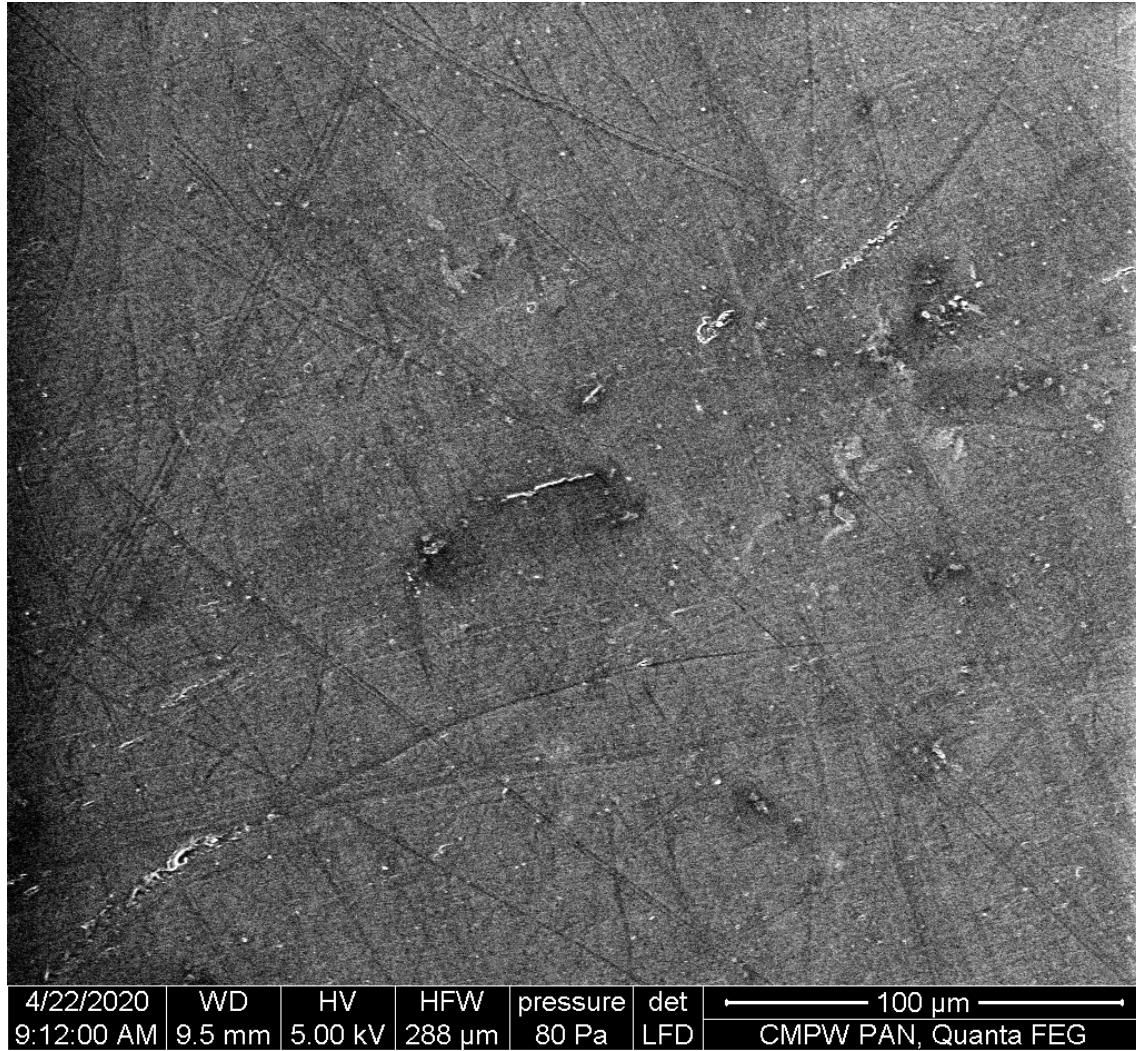
9/18/2018 9:47:16 AM	HV 5.00 kV	HFW 288 μm	WD 9.8 mm	pressure 80 Pa	det LFD	100 μm
					SEM Quanta 250, CMPW PAN	

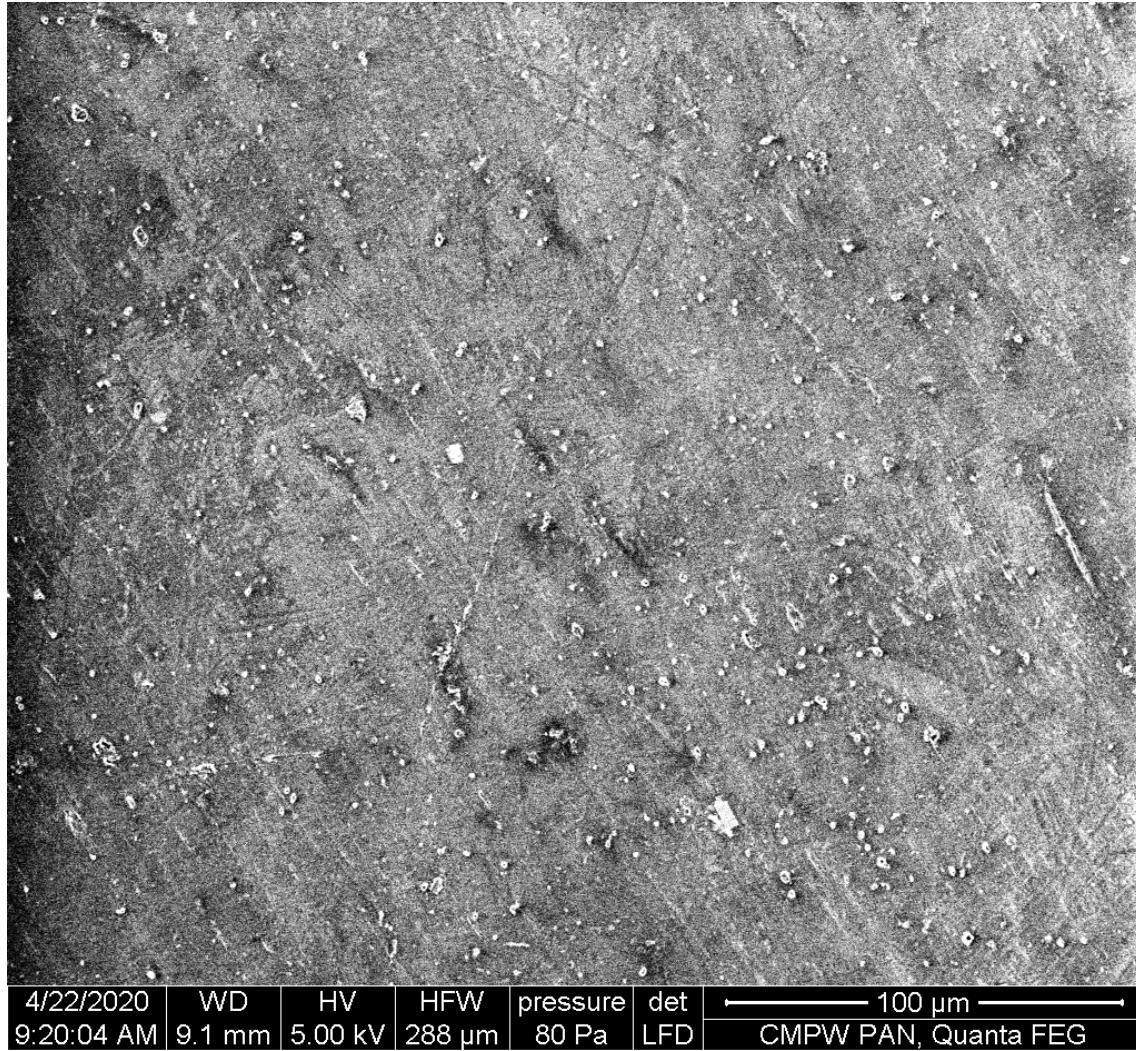
(a) SEM micrographs of the neat P(3HB-*co*-4HB) (100/0) before degradation.



4/22/2020	WD	HV	HFW	pressure	det	100 µm
11:14:25 AM	9.1 mm	5.00 kV	288 µm	80 Pa	LFD	CMPW PAN, Quanta FEG

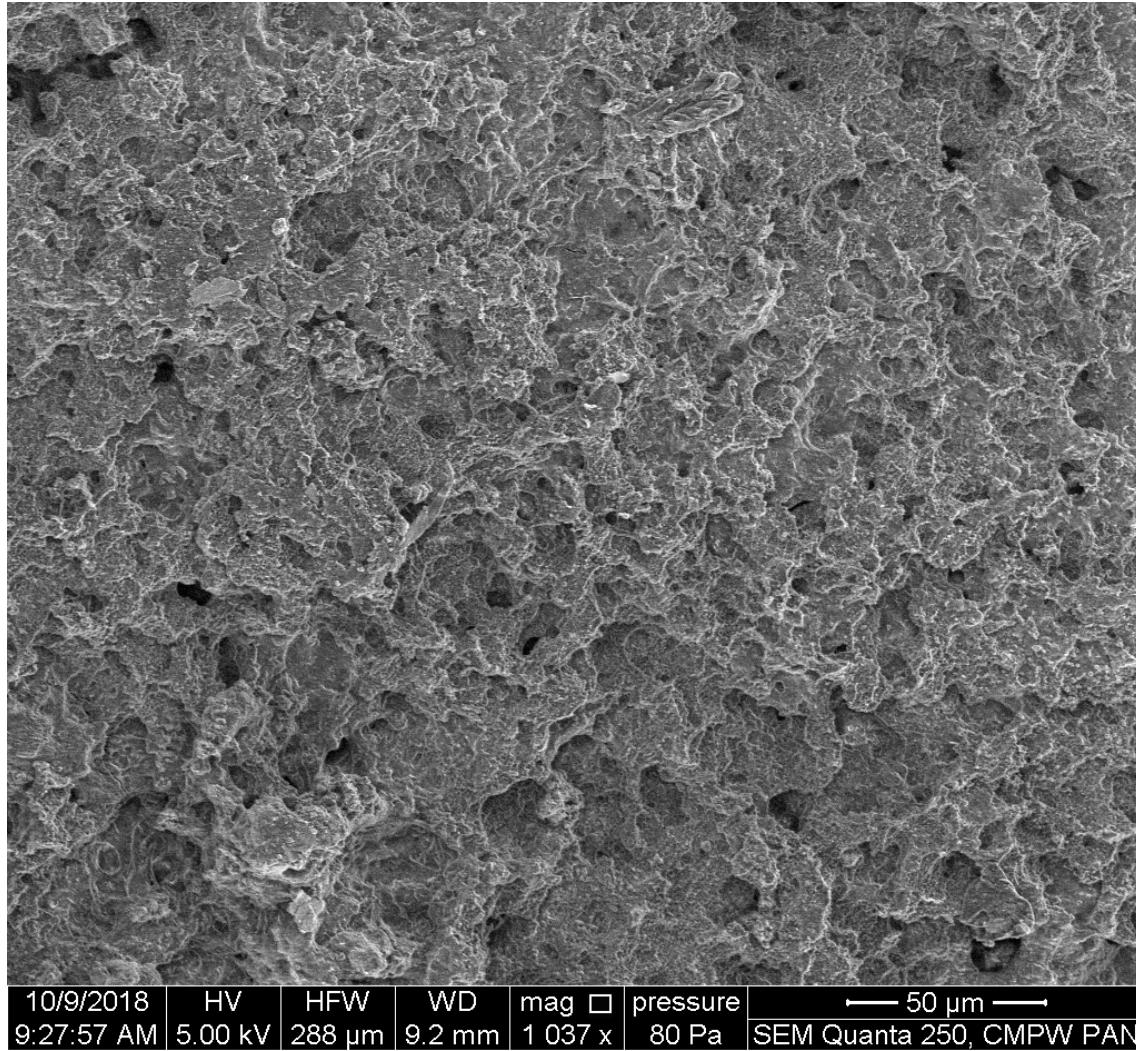
(b) SEM micrographs of the P(3HB-*co*-4HB)/10WF before degradation.

(c) SEM micrographs of the P(3HB-*co*-4HB)/20WF before degradation.



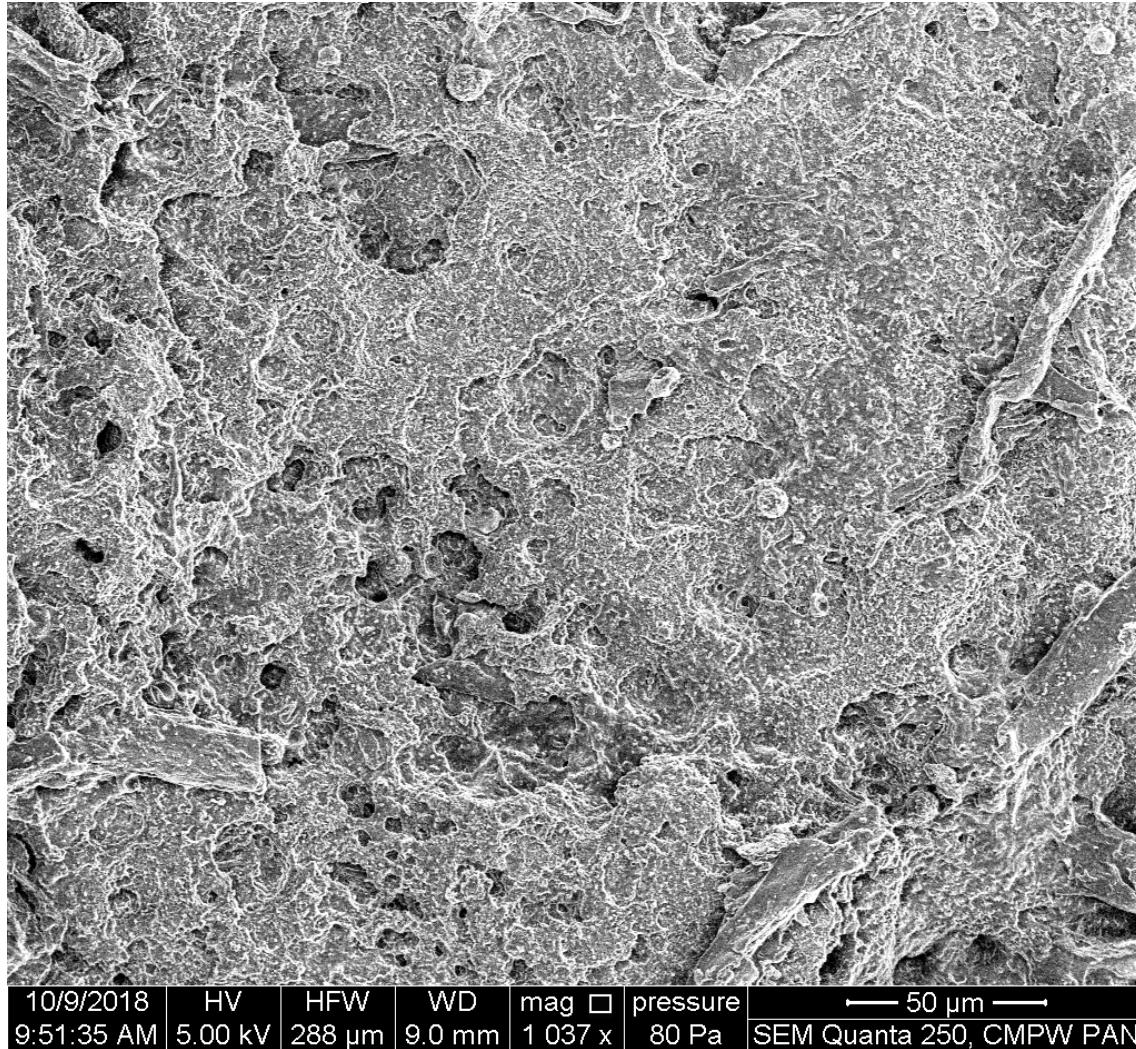
4/22/2020	WD	HV	HFW	pressure	det	100 µm
9:20:04 AM	9.1 mm	5.00 kV	288 µm	80 Pa	LFD	CMPW PAN, Quanta FEG

(d) SEM micrographs of the P(3HB-*co*-4HB)/30WF before degradation.



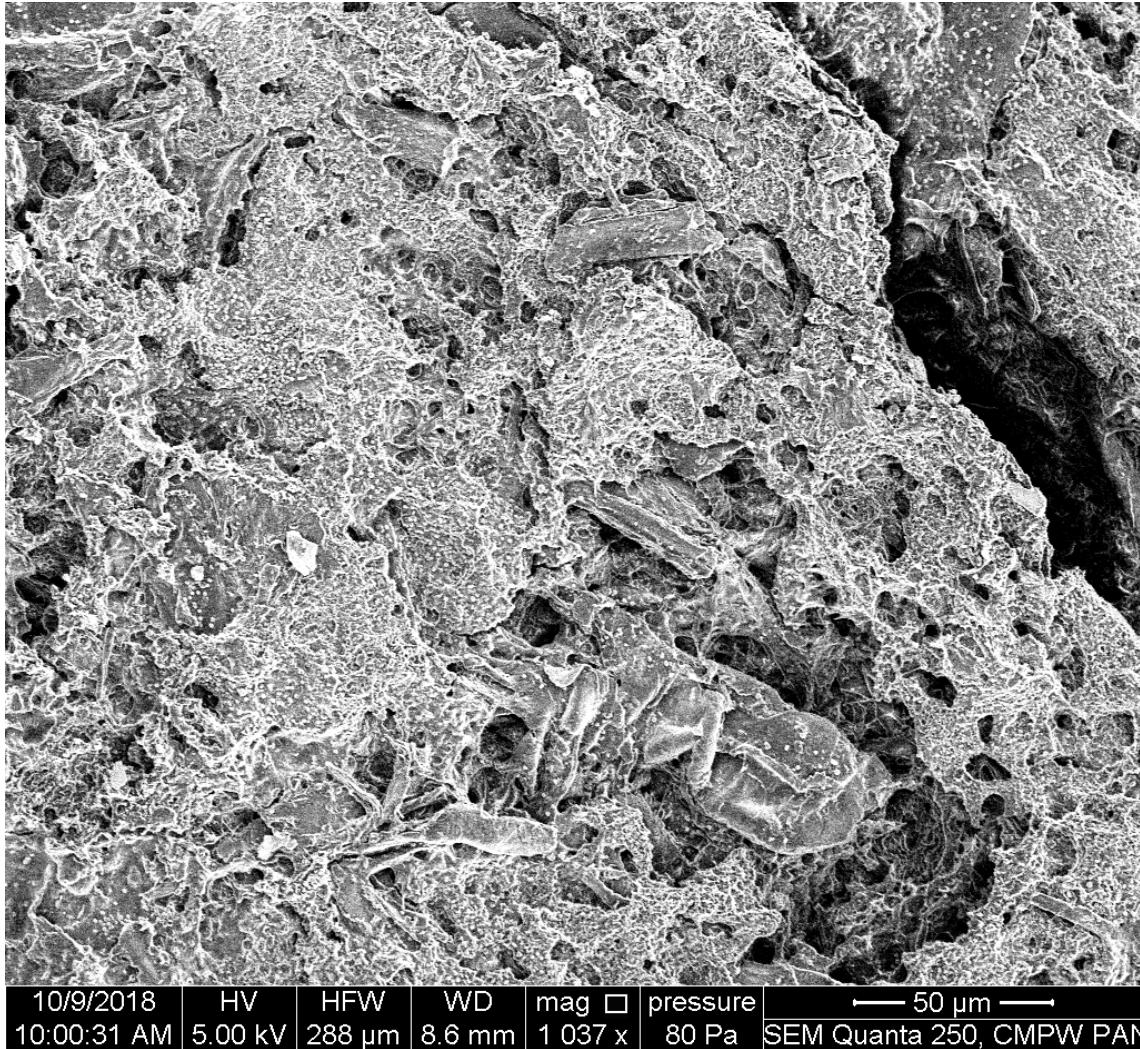
10/9/2018 9:27:57 AM	HV 5.00 kV	HFW 288 µm	WD 9.2 mm	mag □ 1 037 x	pressure 80 Pa	— 50 µm —
SEM Quanta 250, CMPW PAN						

(e) SEM micrographs of the neat P(3HB-*co*-4HB) (100/0) after 21 days of degradation in BIODEGMA.



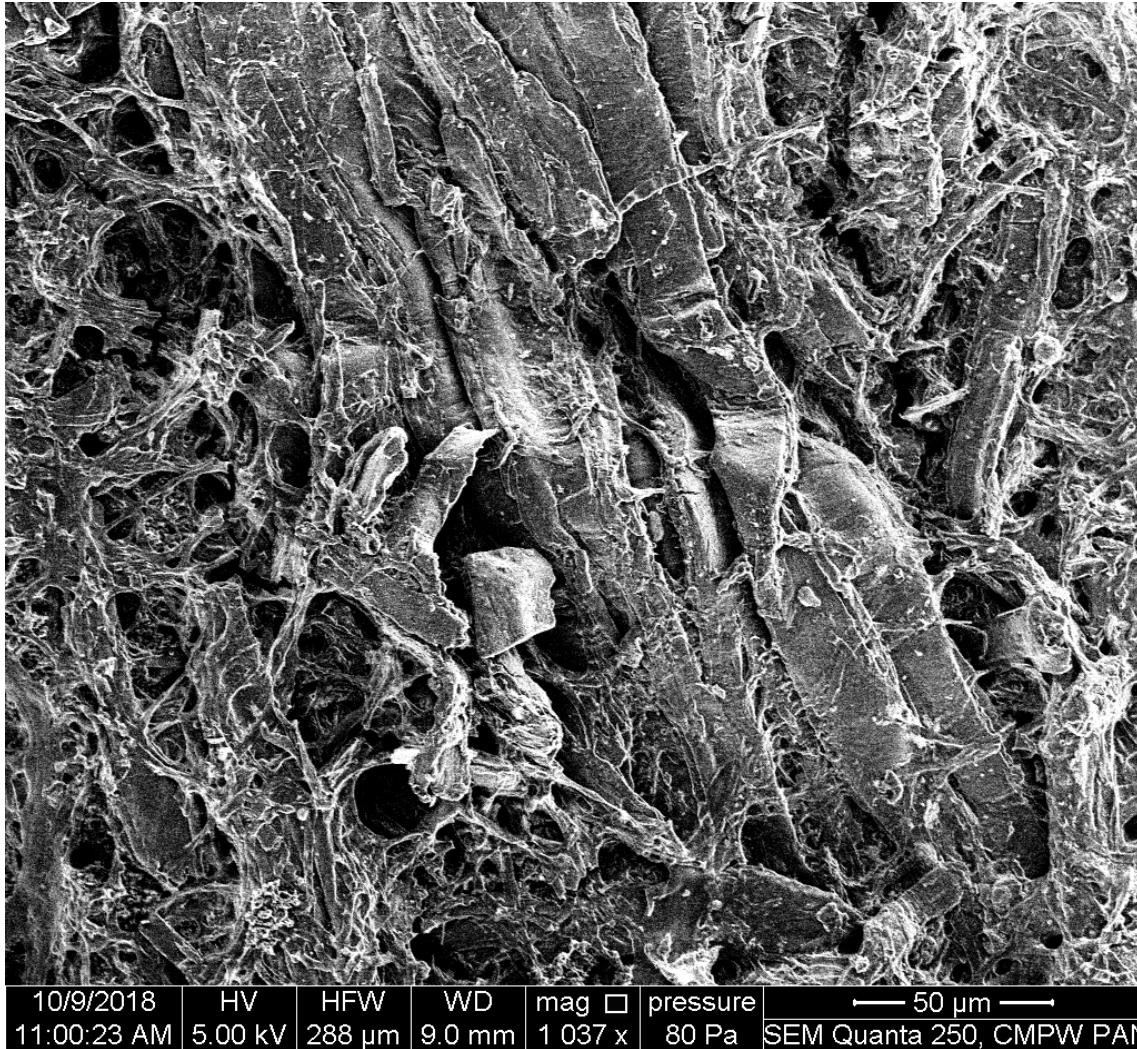
10/9/2018 9:51:35 AM	HV 5.00 kV	HFW 288 µm	WD 9.0 mm	mag 1 037 x	pressure 80 Pa	— 50 µm — SEM Quanta 250, CMPW PAN
-------------------------	---------------	---------------	--------------	----------------	-------------------	---------------------------------------

(f) SEM micrographs of the P(3HB-*co*-4HB)/10WF after 21 days of degradation in BIODEGMA.



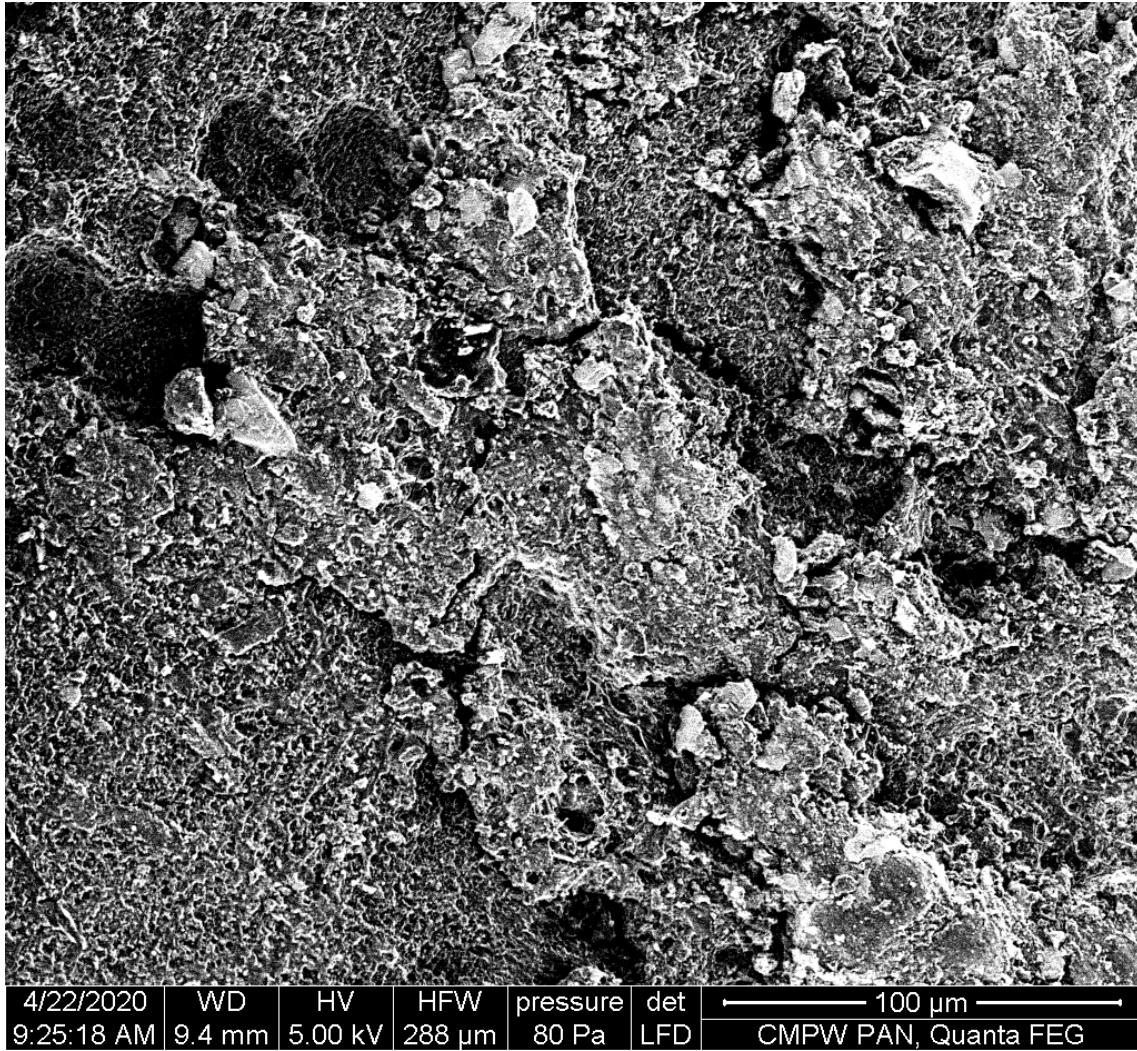
10/9/2018	HV	HFW	WD	mag □	pressure	— 50 µm —
10:00:31 AM	5.00 kV	288 µm	8.6 mm	1 037 x	80 Pa	SEM Quanta 250, CMPW PAN

(g) SEM micrographs of the P(3HB-*co*-4HB)/20WF after 21 days of degradation in BIODEGMA.



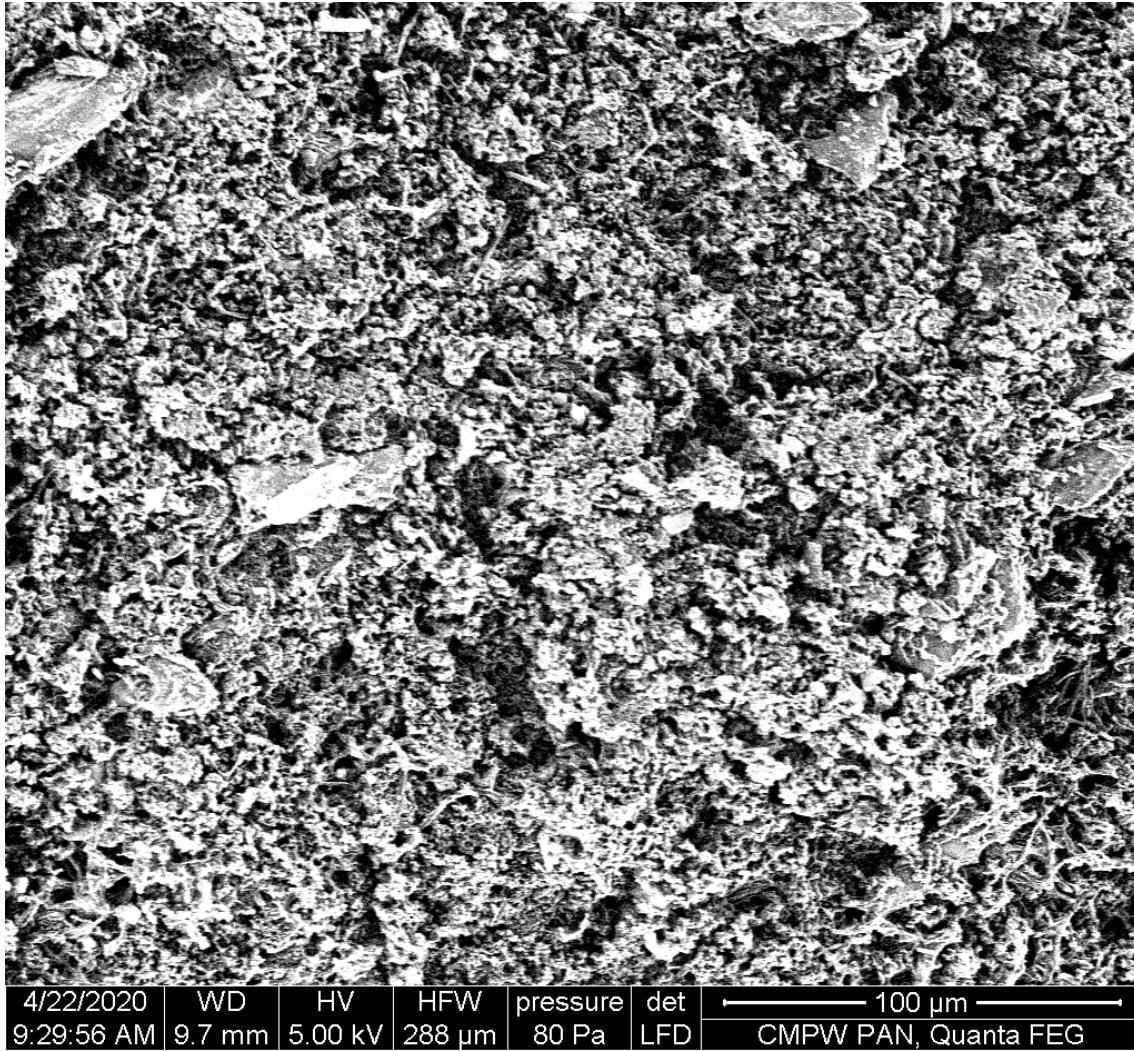
10/9/2018	HV	HFW	WD	mag □	pressure	— 50 µm —
11:00:23 AM	5.00 kV	288 µm	9.0 mm	1 037 x	80 Pa	SEM Quanta 250, CMPW PAN

(h) SEM micrographs of the P(3HB-*co*-4HB)/30WF after 21 days of degradation in BIODEGMA.



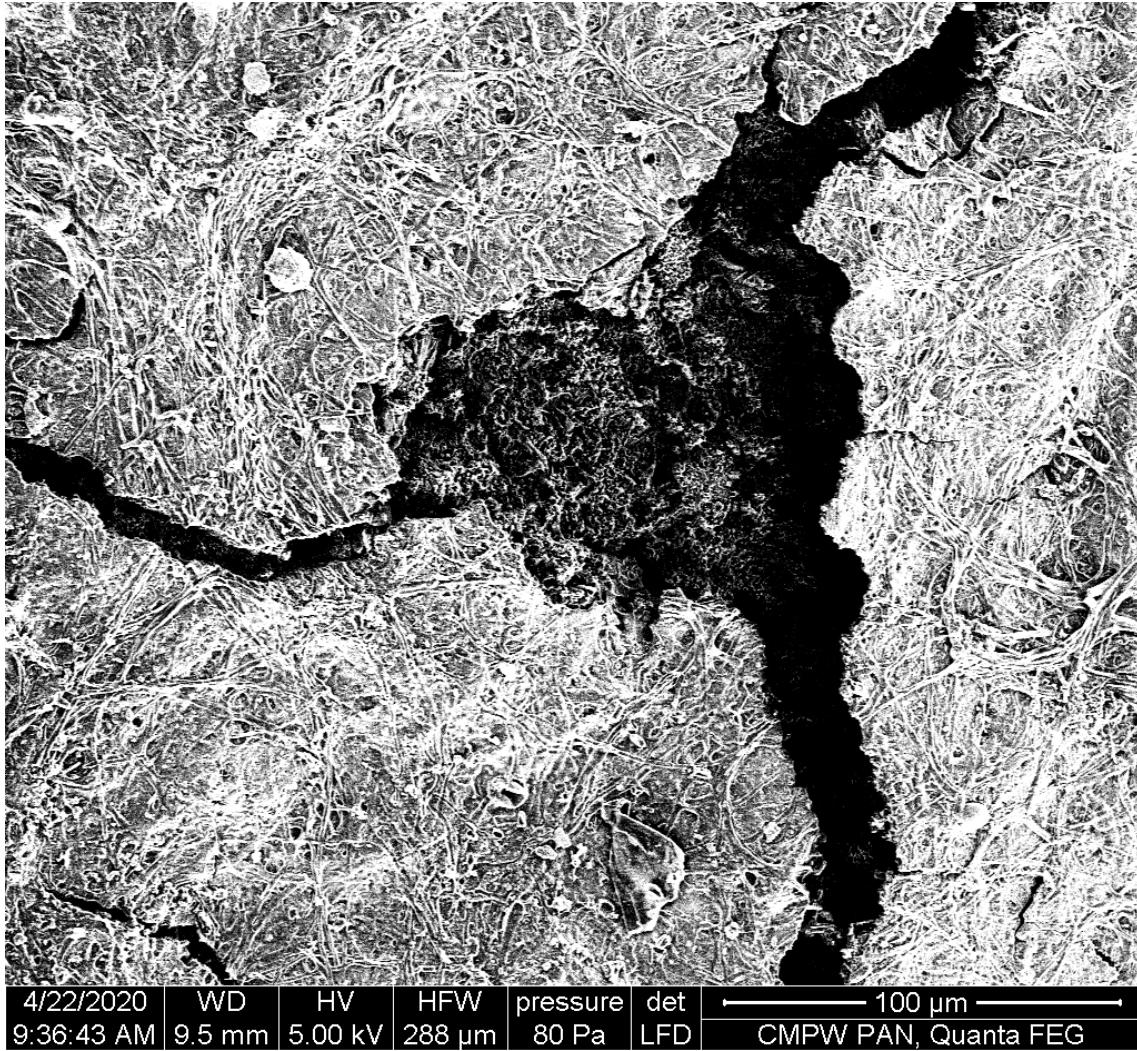
4/22/2020	WD	HV	HFW	pressure	det	100 µm
9:25:18 AM	9.4 mm	5.00 kV	288 µm	80 Pa	LFD	CMPW PAN, Quanta FEG

(i) SEM micrographs of the neat P(3HB-*co*-4HB) (100/0) after 21 days of degradation in Respirometer.



4/22/2020	WD	HV	HFW	pressure	det	100 µm
9:29:56 AM	9.7 mm	5.00 kV	288 µm	80 Pa	LFD	CMPW PAN, Quanta FEG

(j) SEM micrographs of the P(3HB-*co*-4HB)/10WF after 21 days of degradation in Respirometer



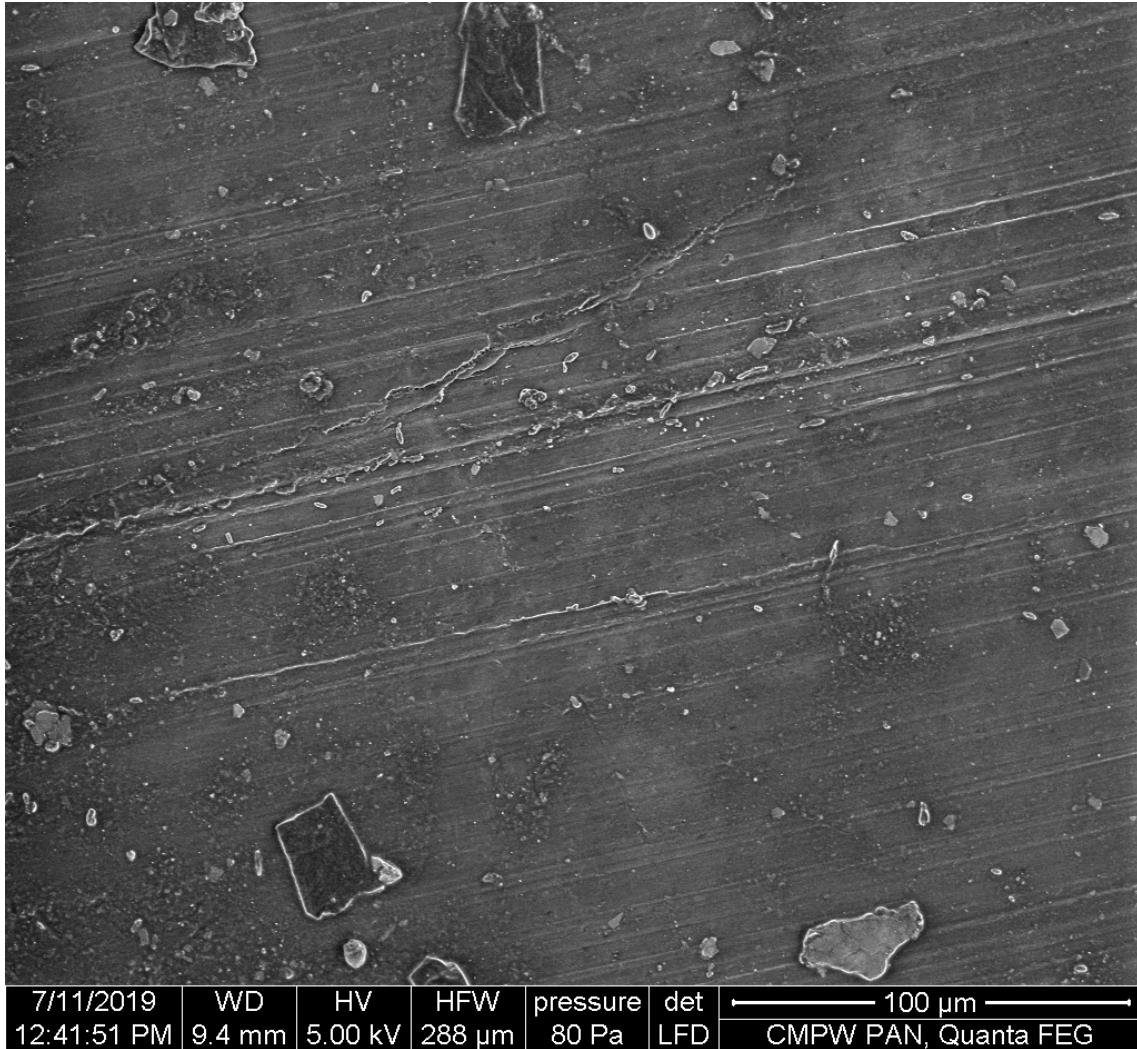
4/22/2020	WD	HV	HFW	pressure	det	100 µm
9:36:43 AM	9.5 mm	5.00 kV	288 µm	80 Pa	LFD	CMPW PAN, Quanta FEG

(k) SEM micrographs of the P(3HB-*co*-4HB)/20WF after 21 days of degradation in Respirometer.

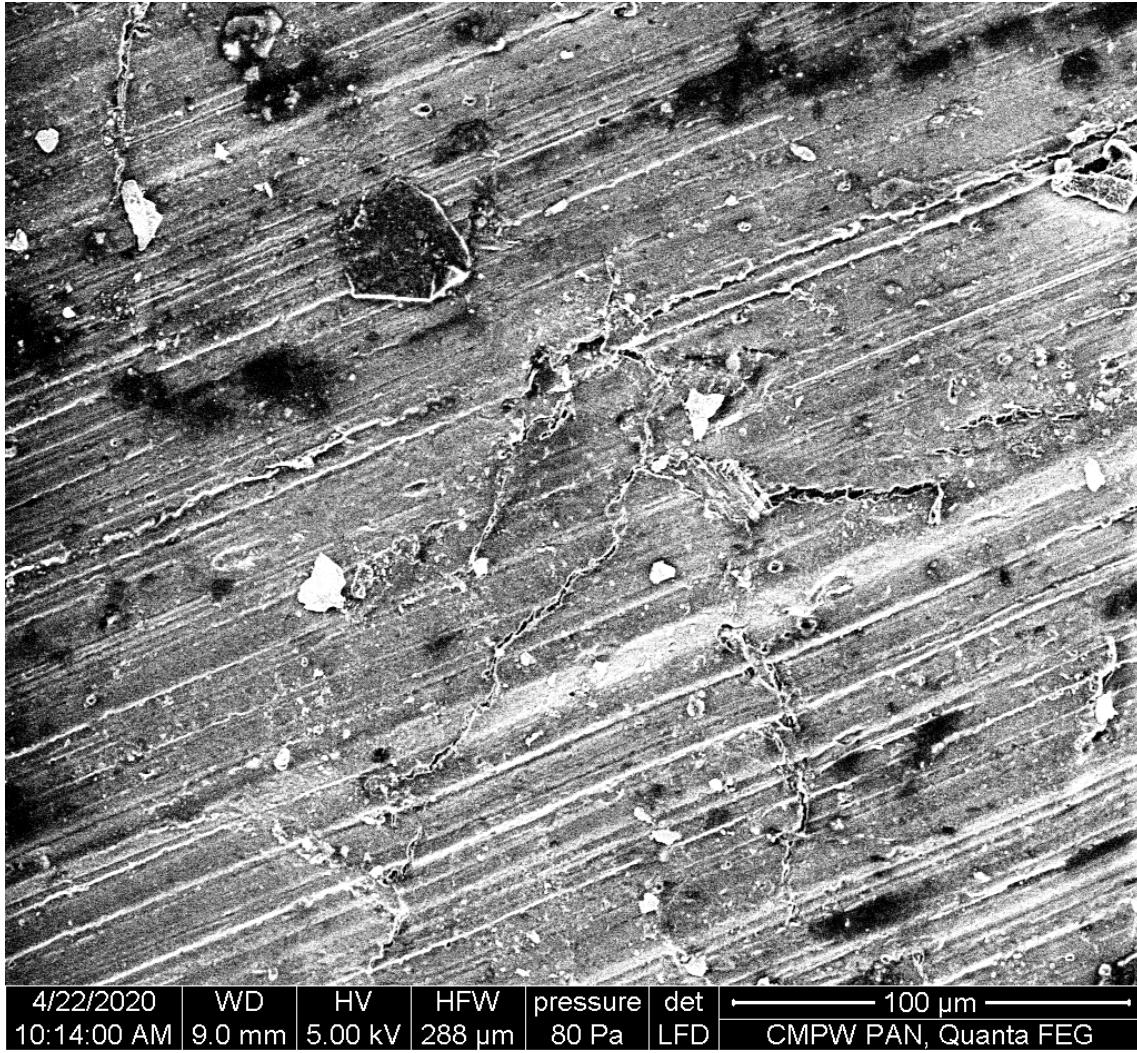


4/22/2020	WD	HV	HFW	pressure	det	100 µm
9:41:15 AM	9.4 mm	5.00 kV	288 µm	80 Pa	LFD	CMPW PAN, Quanta FEG

(I) SEM micrographs of the P(3HB-*co*-4HB)/30WF after 21 days of degradation in Respirometer.

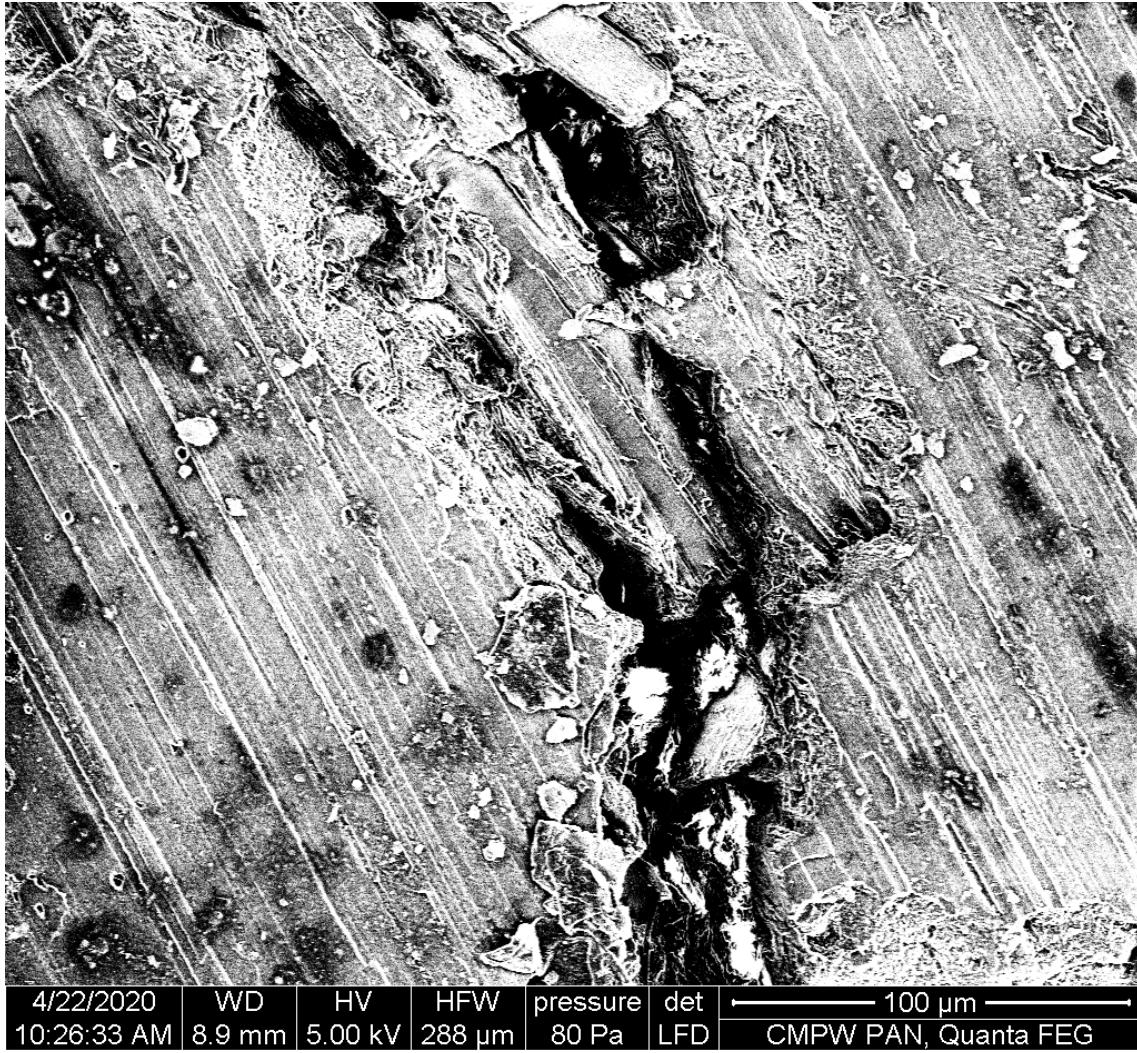


(m) SEM micrographs of the neat P(3HB-*co*-4HB) (100/0) after 21 days of degradation in water.



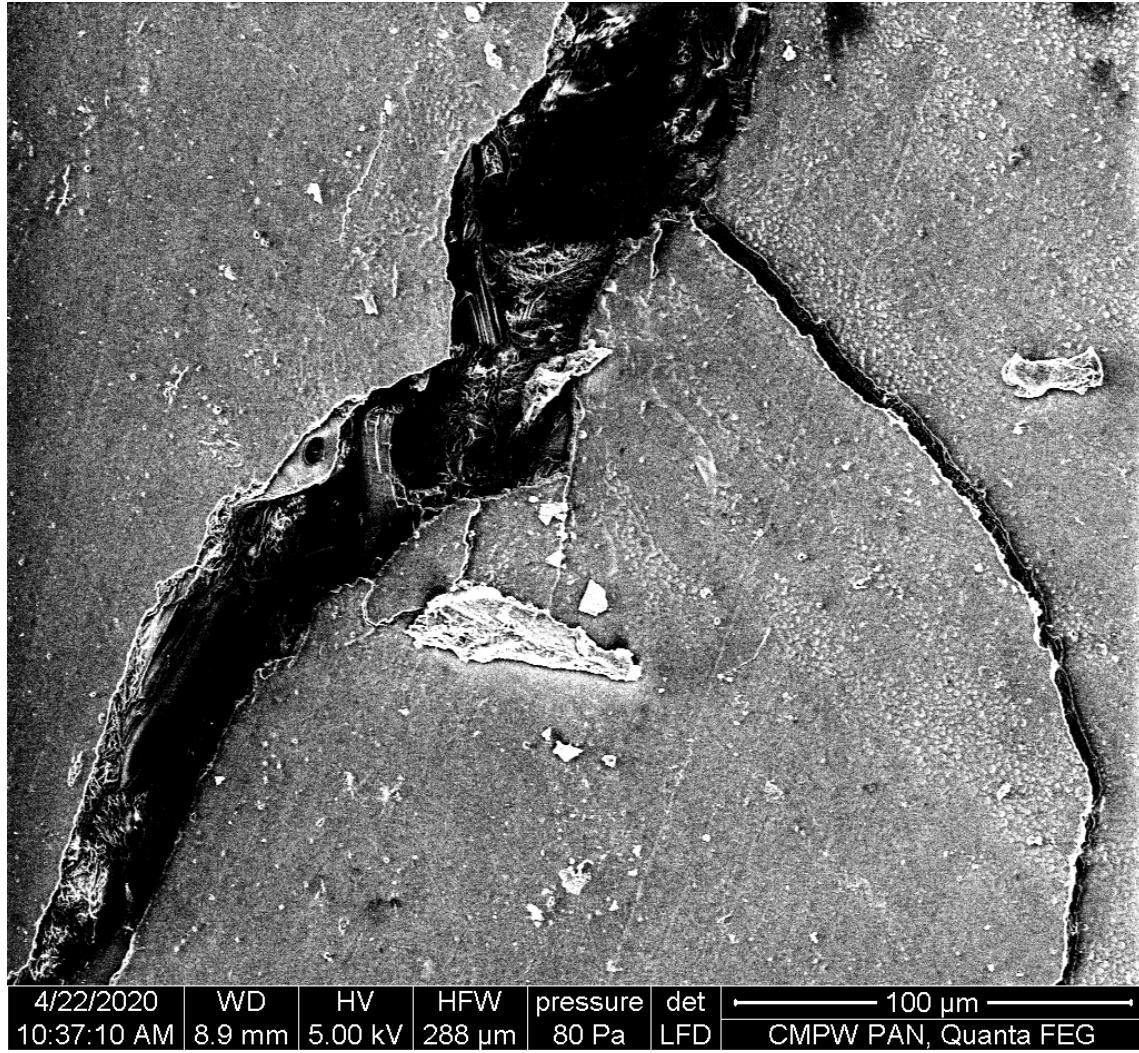
4/22/2020	WD	HV	HFW	pressure	det	100 µm
10:14:00 AM	9.0 mm	5.00 kV	288 µm	80 Pa	LFD	CMPW PAN, Quanta FEG

(n) SEM micrographs of the P(3HB-*co*-4HB)/10WF after 21 days of degradation in water.



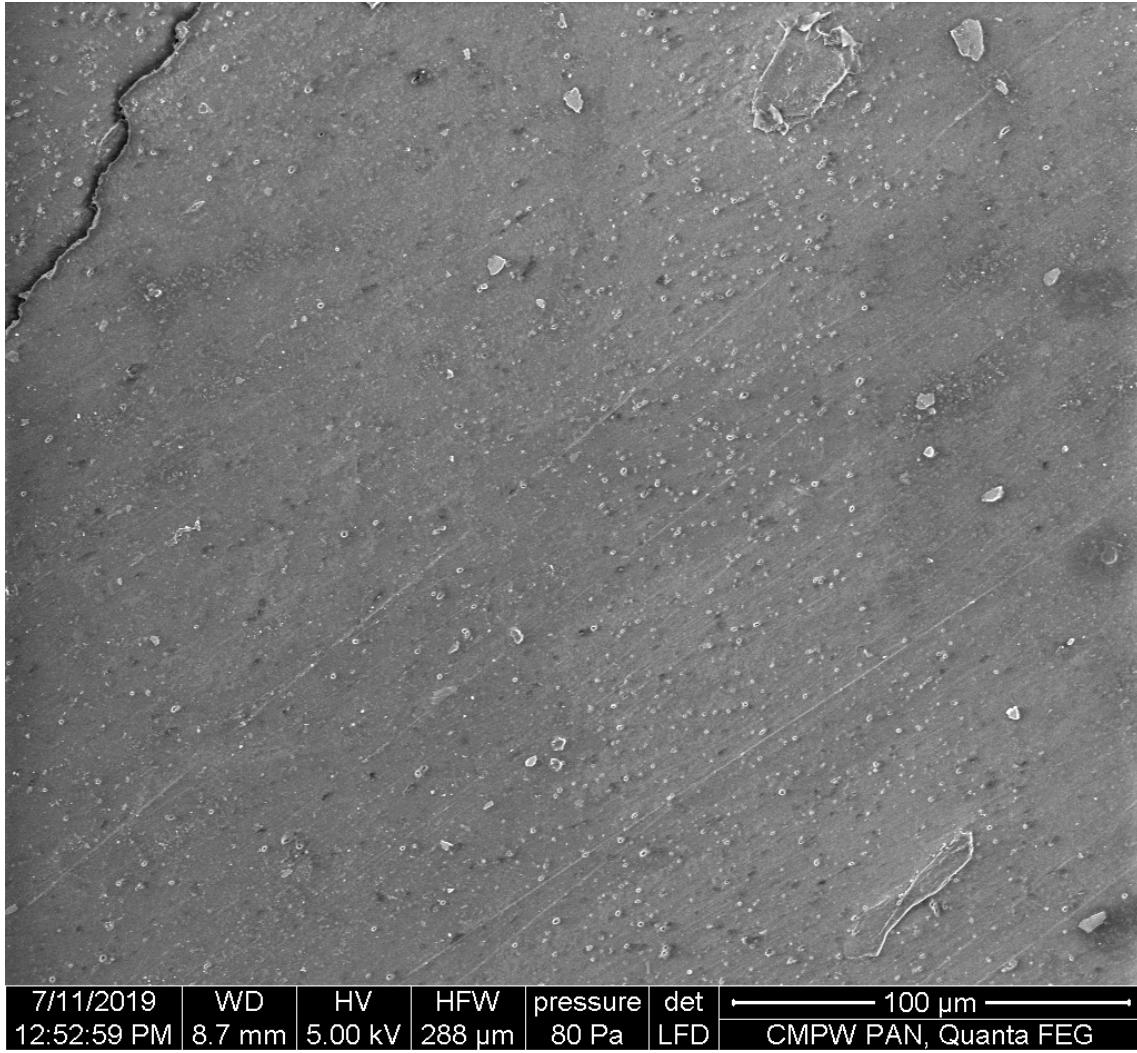
4/22/2020	WD	HV	HFW	pressure	det	100 µm
10:26:33 AM	8.9 mm	5.00 kV	288 µm	80 Pa	LFD	CMPW PAN, Quanta FEG

(o) SEM micrographs of the P(3HB-*co*-4HB)/20WF after 21 days of degradation in water.



4/22/2020 10:37:10 AM	WD 8.9 mm	HV 5.00 kV	HFW 288 µm	pressure 80 Pa	det LFD	100 µm
CMPW PAN, Quanta FEG						

(p) SEM micrographs of the P(3HB-*co*-4HB)/30WF after 21 days of degradation in water.



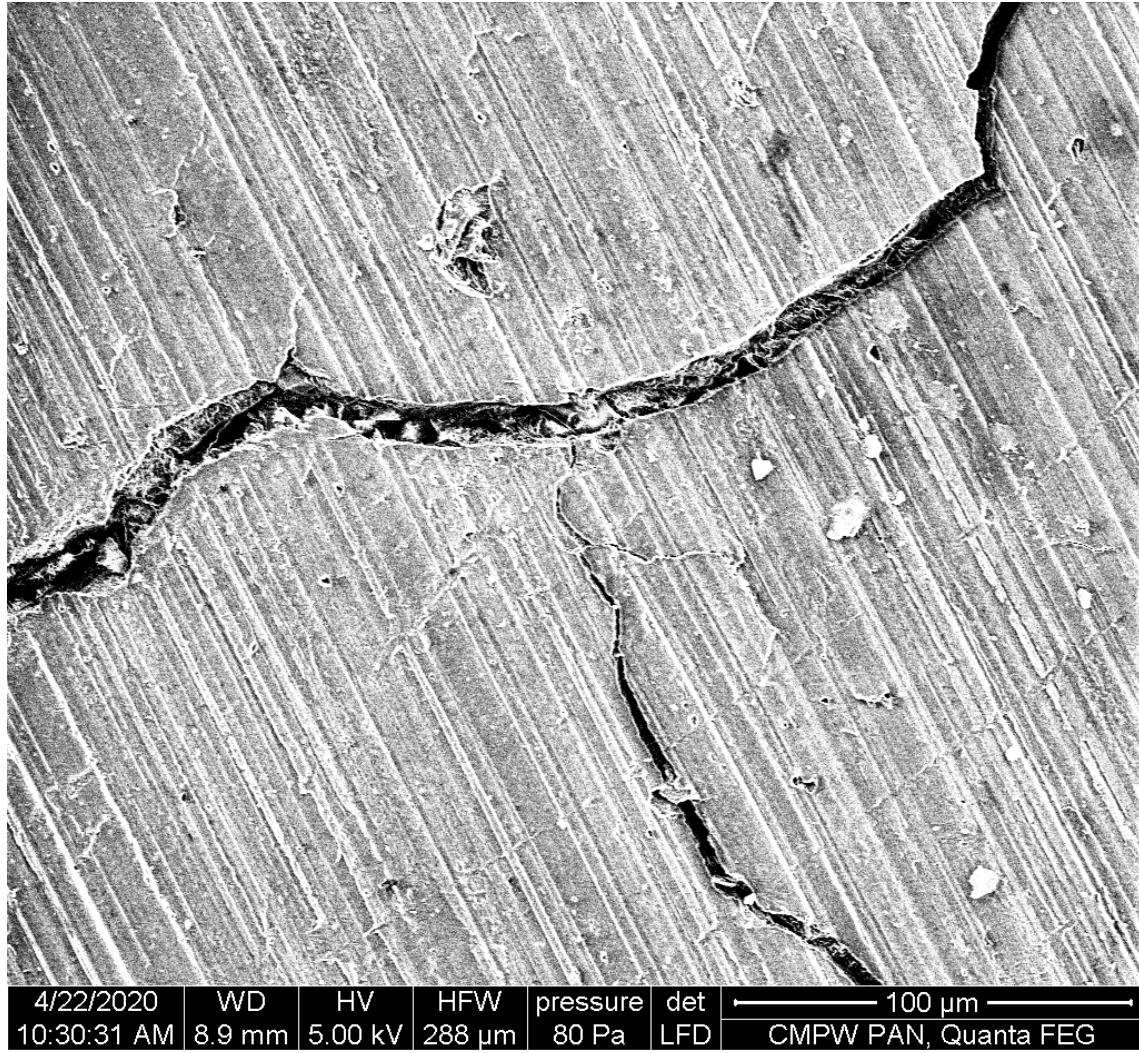
7/11/2019 12:52:59 PM	WD 8.7 mm	HV 5.00 kV	HFW 288 μm	pressure 80 Pa	det LFD	100 μm
CMPW PAN, Quanta FEG						

(q) SEM micrographs of the neat P(3HB-*co*-4HB) (100/0) after 21 days of degradation in buffer.

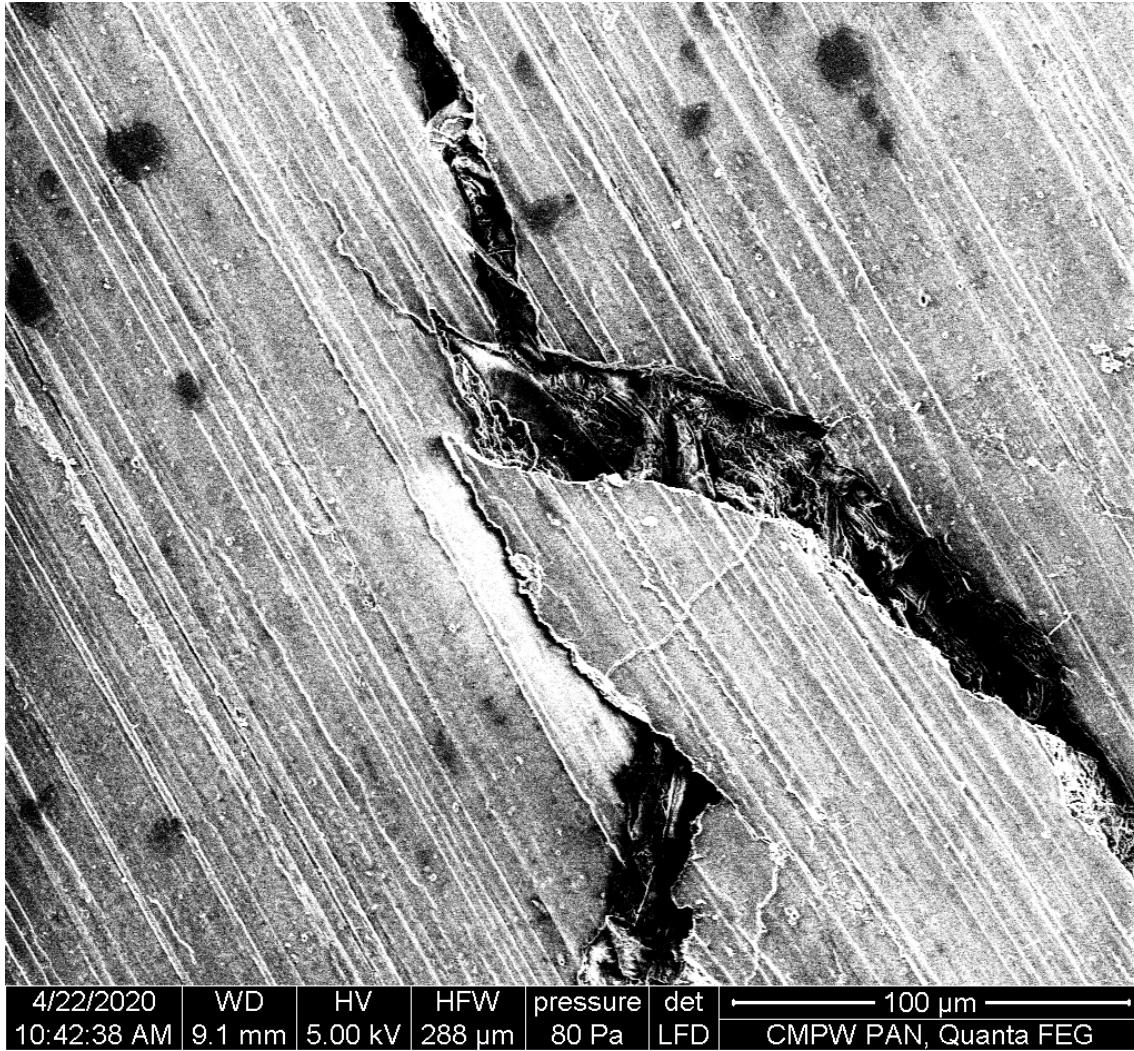


4/22/2020	WD	HV	HFW	pressure	det	100 µm
10:20:52 AM	8.9 mm	5.00 kV	288 µm	80 Pa	LFD	CMPW PAN, Quanta FEG

(r) SEM micrographs of the P(3HB-*co*-4HB)/10WF after 21 days of degradation in buffer.



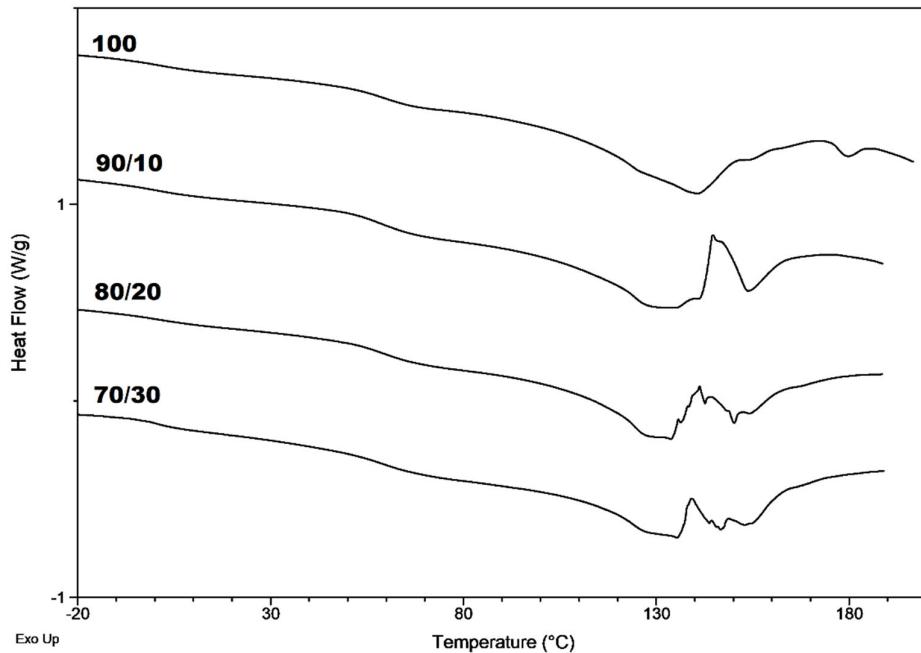
(s) SEM micrographs of the P(3HB-*co*-4HB)/20WF after 21 days of degradation in buffer.



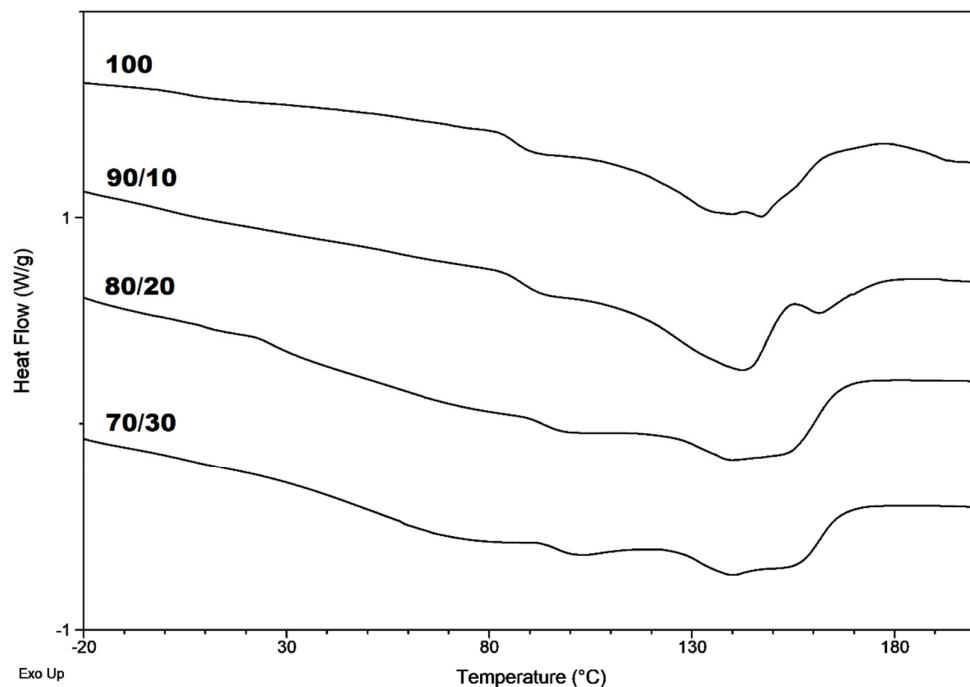
4/22/2020	WD	HV	HFW	pressure	det	100 μm
10:42:38 AM	9.1 mm	5.00 kV	288 μm	80 Pa	LFD	CMPW PAN, Quanta FEG

(t) SEM micrographs of the P(3HB-*co*-4HB)/30WF after 21 days of degradation in buffer.

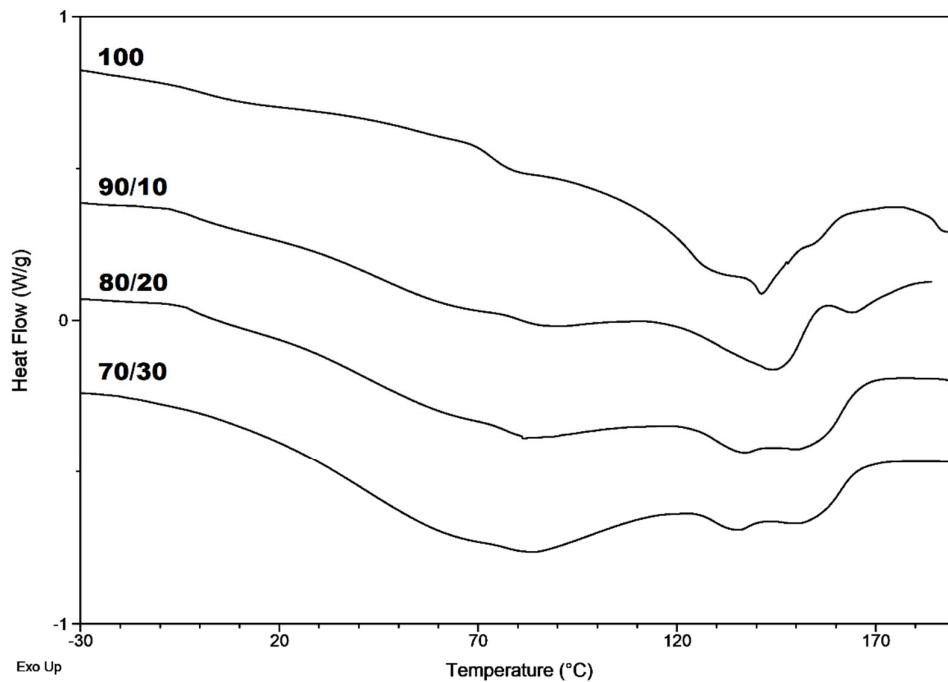
Figure S1. SEM micrographs.



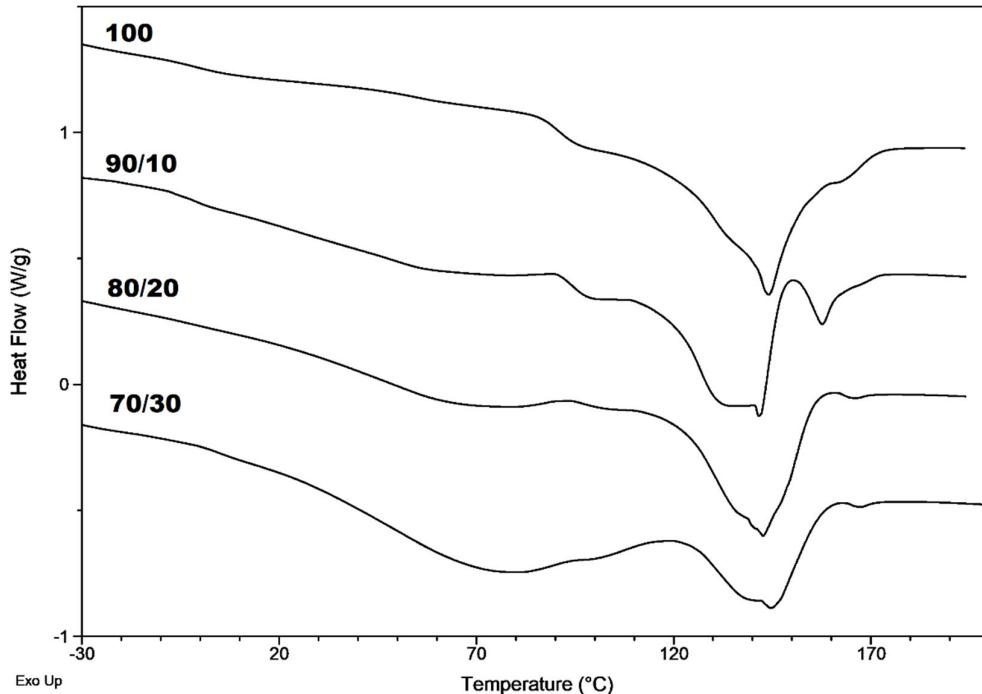
(a) DSC plot of neat P(3HB-*co*-4HB) (100/0) and P(3HB-*co*-4HB)/WF composites with the mass ratio of 90/10, 80/20 and 70/30 before degradation.



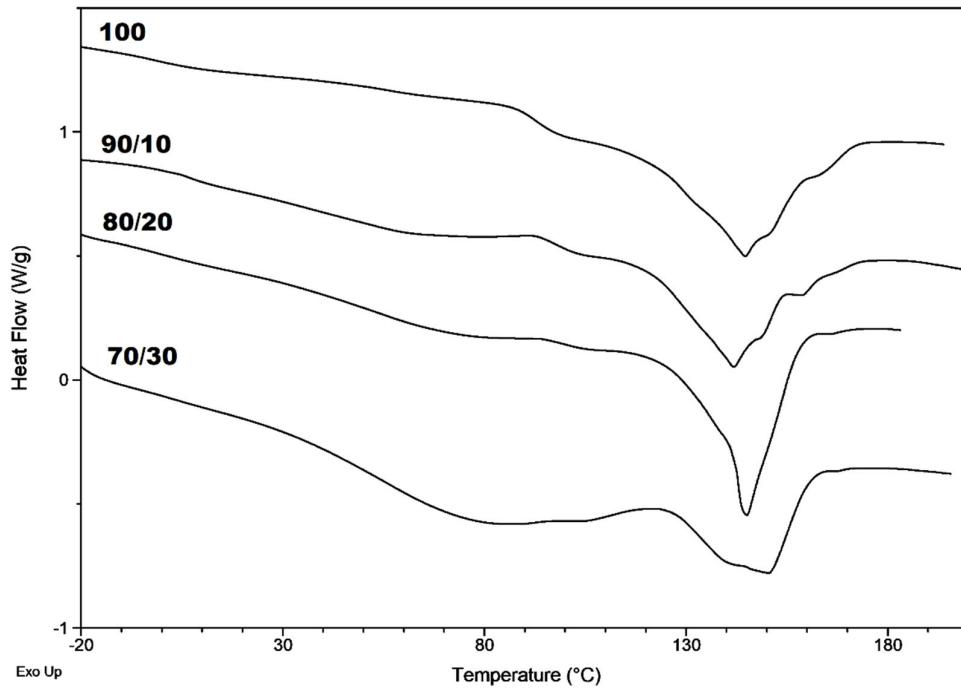
(b) DSC plot of neat P(3HB-*co*-4HB) (100/0) and P(3HB-*co*-4HB)/WF composites with the mass ratio of 90/10, 80/20 and 70/30 after 21 days of degradation in the BIODEGMA.



(c) DSC plot of neat P(3HB-*co*-4HB) (100/0) and P(3HB-*co*-4HB)/WF composites with the mass ratio of 90/10, 80/20 and 70/30 after 21 days of degradation in the respirometer.



(d) DSC plot of neat P(3HB-*co*-4HB) (100/0) and P(3HB-*co*-4HB)/WF composites with the mass ratio of 90/10, 80/20 and 70/30 after 21 days of degradation in the water.



(e) DSC plot of neat P(3HB-*co*-4HB) (100/0) and P(3HB-*co*-4HB)/WF composites with the mass ratio of 90/10, 80/20 and 70/30 after 21 days of degradation in the buffer.

Figure 2. DSC plot.



© 2020 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).