

<http://dx.doi.org/10.21577/1984-6835.20240019>

Renewable Polymers from Passion Fruit Vegetable Oils Extracted by Different Methods

Polímeros renováveis obtidos Partir de Óleos Vegetais de Maracujá Extraídos por Diferentes Métodos

Victória R. A. Carneiro,^a Caroline Gaglieri,^a (<https://orcid.org/0000-0001-9612-6887>)

Rafael T. Alarcon,^b (<https://orcid.org/0000-0003-2798-9587>) Gabriel I. Santos,^a

(<https://orcid.org/0000-0002-0307-203X>) Fernanda B. Santos,^a

(<https://orcid.org/0009-0006-1990-1492>) Gilbert Bannach^{a,*}(<https://orcid.org/0000-0002-8790-5069>)

^a *Universidade Estadual Paulista, Faculdade de Ciências, Departamento de Química, CEP 17033-260, Bauru-SP, Brasil*

^b *Universidade de São Paulo, Instituto de Química de São Carlos, CEP 13566-590, São Carlos-SP, Brasil*

* gilbert.bannach@unesp.br

Supplementary Information

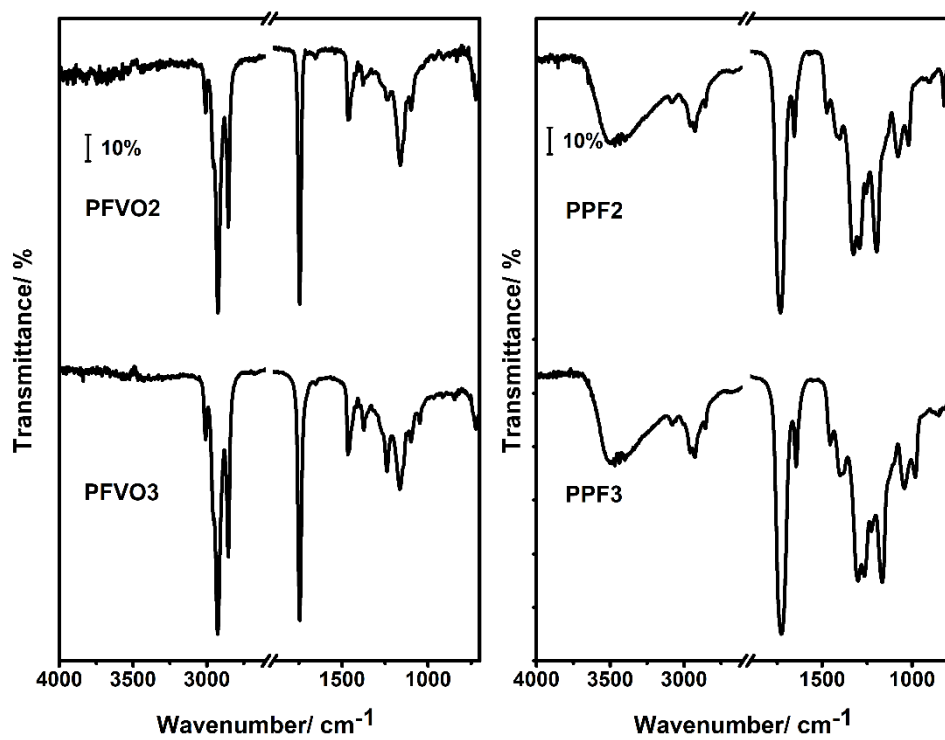


Figure S1. MIR spectra of different passion fruit vegetable oils (PFVO) and the respective polymers (PPF)

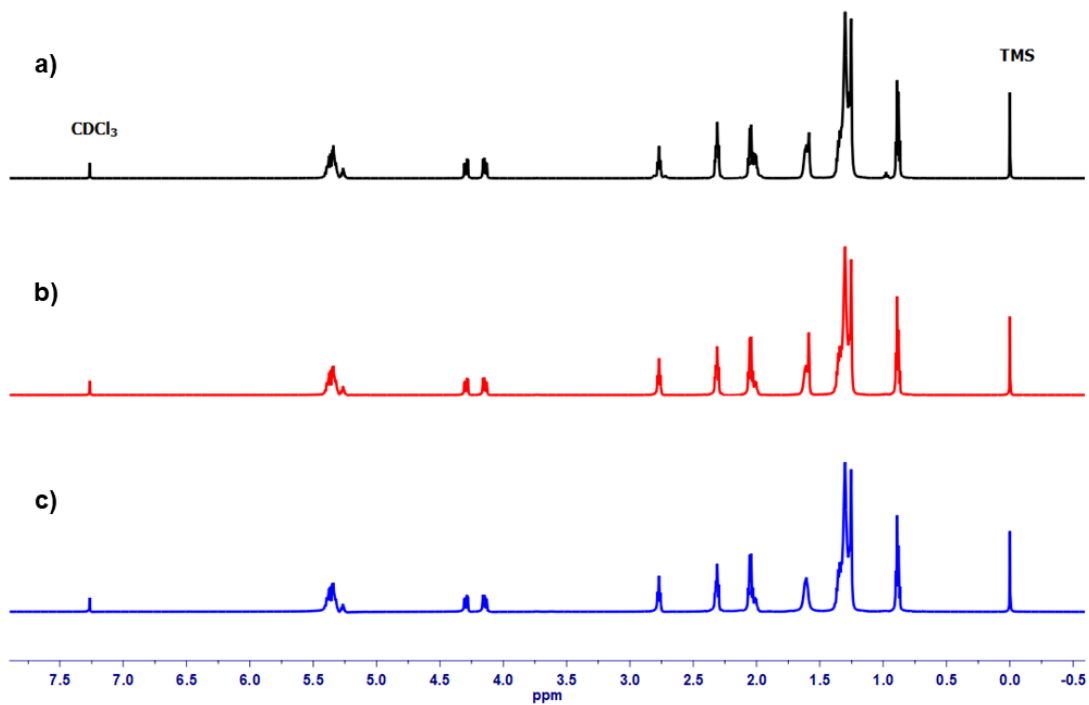


Figure S2. $^1\text{H-NMR}$ spectra of different passion fruit vegetable oils: a) PFVO1, b) PFVO2, and c) PFVO3

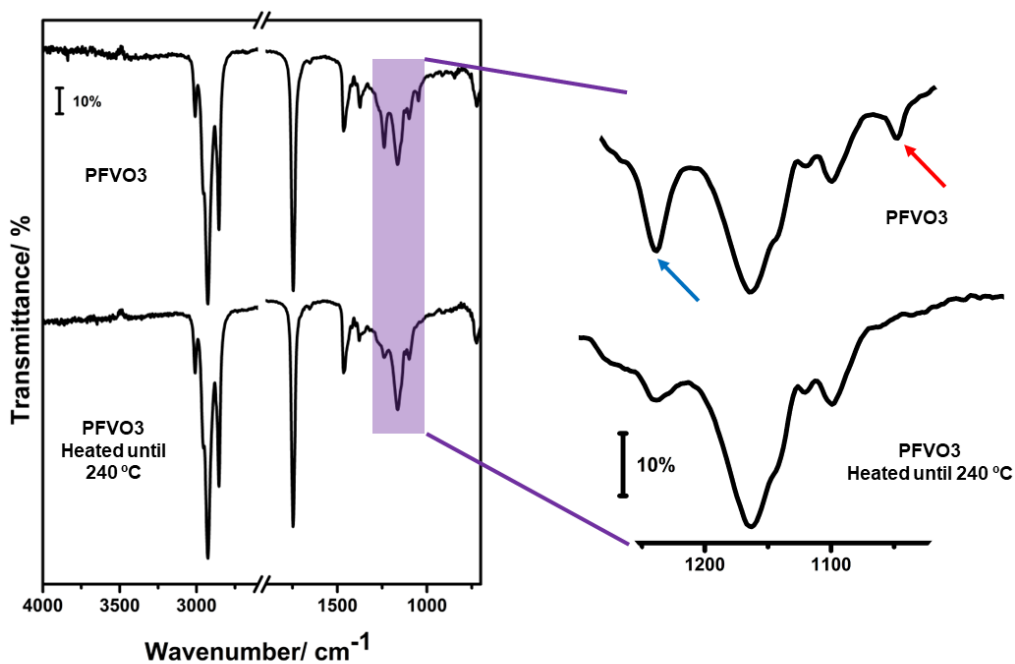


Figure S3. MIR spectra of samples derived from passion fruit vegetable oil extracted by soxhlet (PFVO3) at room temperature and then after heating it until 240 °C

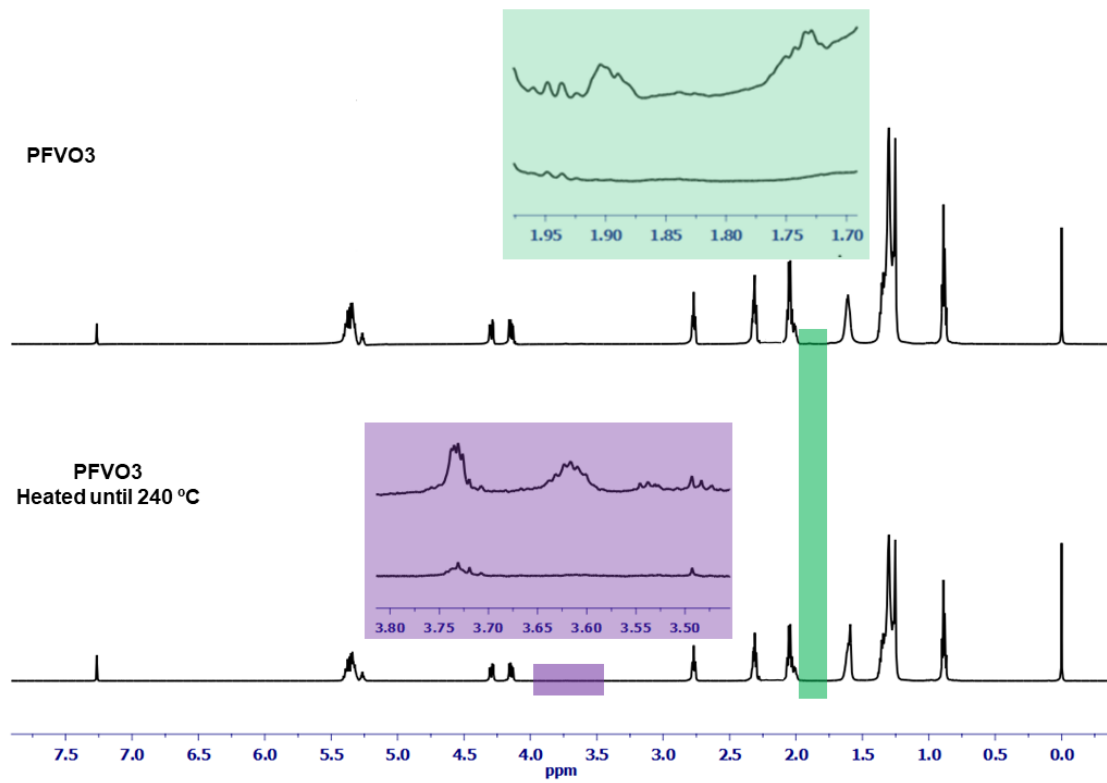


Figure S4. ¹H-NMR spectra of samples derived from passion fruit vegetable oil extracted by soxhlet (PFVO3) at room temperature and then after heating it until 240 °C

Table S1. Temperature range (ϑ); mass loss value (Δm); peak temperature (T_p), maximum degradation rate (MDR); and temperature of maximum degradation rate (T_{MDR}) observed for each sample.

Sample	PFVO1	PFVO2	PFVO3	PPF1	PPF3	PPF4	
1st Step	$\vartheta/^\circ\text{C}$	-	-	68.8-240.0	87.3-194.7	97.2-209.3	83.3-208.0
	$\Delta m/\%$	-	-	4.97	1.36	3.17	2.29
	$T_p/^\circ\text{C}$	-	-	-	-	-	-
	MDR/ % $^\circ\text{C}^{-1}$	-	-	-	-	-	-
	$T_{MDR}/^\circ\text{C}$	-	-	-	-	-	-
2nd Step	$\vartheta/^\circ\text{C}$	275.5-459.8	283.5-464.2	287.6-462.2	194.7-440.2	209.3-436.0	208.0-448.8
	$\Delta m/\%$	91.79	92.31	85.54	74.89	72.85	77.70
	$T_p/^\circ\text{C}$	↑ 388.2	↑ 392.6	↑ 394.0	↑ 341.6 ↑ 367.1 ↑ 408.7	↑ 405.2	(298.5-378.5)* ↑ 409.9
	MDR/ % $^\circ\text{C}^{-1}$	13.7	10.3	11.5	8.8	9.3	11.8
	$T_{MDR}/^\circ\text{C}$	411.4	411.0	403.8	398.5	373.0	401.8
3rd Step	$\vartheta/^\circ\text{C}$	459.8-594.0	464.2-590.8	462.2-587.7	440.2-604.3	436.0-584.8	448.8-591.9
	$\Delta m/\%$	8.21	7.69	9.49	23.75	23.98	20.01
	$T_p/^\circ\text{C}$	↑ 489.9	↑ 503.1	↑ 486.4	↑ 546.1	↑ 534.6	↑ 539.9
	MDR/ % $^\circ\text{C}^{-1}$	-	-	-	2.6	2.7	2.21
	$T_{MDR}/^\circ\text{C}$	-	-	-	556.1	532.4	549.6

*exotherm; ↑exothermic peak.

Table S2. Values of peak temperature (T_p) and enthalpy (ΔH) observed in each event of crystallization (Crist) and melting (Melt) in each stage.

Sample		PFVO1	PFVO2	PFVO3
1st cooling	$T_{pCrist}/ ^\circ\text{C}$	↑ -32.1	↑ -30.5	↑ -28.3
	$\Delta H_{Crist}/ \text{J g}^{-1}$	2.6	1.1	1.3
1st heating	$T_{pCrist}/ ^\circ\text{C}$	↓ -7.6	↓ -13.5	↓ -14.6
	$\Delta H_{Crist}/ \text{J g}^{-1}$	4.0	2.3	5.2
2nd cooling	$T_{pCrist}/ ^\circ\text{C}$	↑ -22.0	↑ -24.0	↑ 25.0
	$\Delta H_{Crist}/ \text{J g}^{-1}$	1.1	1.2	0.8
2nd heating	$T_{pCrist}/ ^\circ\text{C}$	↓ -11	↓ -13.4	↓ -12.0
	$\Delta H_{Crist}/ \text{J g}^{-1}$	3.8	2.1	4.3

Table S3. Values of peak temperature (T_p); enthalpy (ΔH); onset temperature (T_{onset}); and midpoint temperature ($T_{midpoint}$) associated with the glass transitions observed in each stage of the polymers obtained from the passion fruit oils.

Sample		PPF1	PPF3	PPF4
1st heating	$T_p/ ^\circ\text{C}$	↓ 157.2	↓ 153.0	↓ 161.6
	$\Delta H/ \text{J g}^{-1}$	12.8	74.8	42.64
1st cooling	$T_{g_{onset}}/ ^\circ\text{C}$	40.0	48.0	37.0
	$T_{g_{midpoint}}/ ^\circ\text{C}$	34.4	40.5	32.2
2nd heating	$T_{g_{onset}}/ ^\circ\text{C}$	32.1	39.0	29.0
	$T_{g_{midpoint}}/ ^\circ\text{C}$	39.2	49.2	35.1