

*Supplementary Material*

# Scanning Electron Microscopy and Raman Spectroscopy characterization of Structural Changes Induced by Thermal Treatment in Innovative Bio-Based Polyamide Nanocomposites

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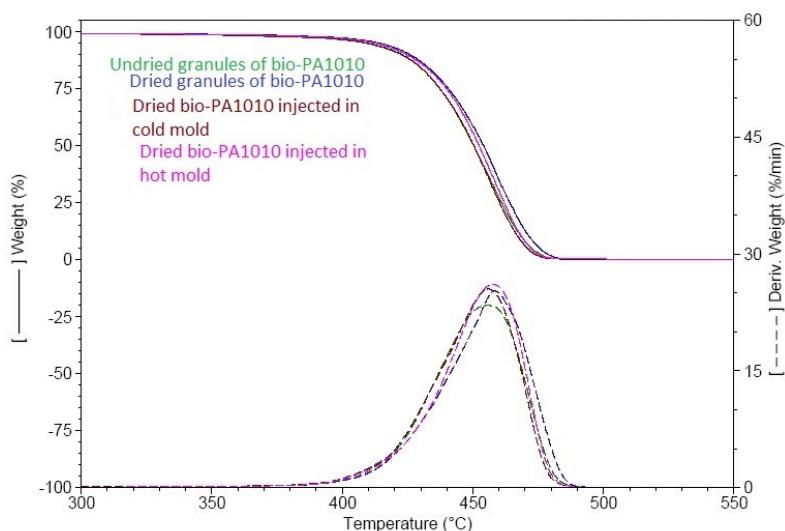
## *Thermogravimetric analysis data*

### Operation parameters:

Instrument: Q5000IR (TA Instruments)  
Sample size: 5 - 15 mg  
Sample Pan: Platinum 100µL  
Purge Gas 1: Nitrogen (99.999%) 50 ml/min  
Purge Gas 2: Air (99.999%) 50 ml/min  
Method: 1) Ramp 10°C/min to 700°C;  
2) Select gas 2;  
3) Isothermal for 5min.

Tmax (°C) = T(dα/dt)max

RT (Room Temperature) = 25 - 40°C



**Figure S1.** Thermogravimetric analysis showing the thermal stability for bio-PA1010 granules in undried and dried state, and for the bio-PA1010 injected in cold and hot mold, respectively.

TGA analysis for bio-PA1010 was performed on dry and non-dried bio-PA1010 granules, as well as on samples injected into cold and hot molds. It can be observed that the thermal stability of bio-PA1010 is very little influenced by drying or by injection into a hot or cold mold. Bio-PA1010 has a very good thermal stability. Up to 200°C it loses approx. 0.5% of the mass, and 5% is lost only in the range of 209-214°C. The maximum speed of decomposition is recorded at 455-458°C.

**Table S1.** Table containing main parameters monitored during thermogravimetric analysis (weight loss, temperature of onset and the residues at 700°C).

	RT - 200°C	Wt loss 5%	Onset Point		T(da/dt)max	Residue at 700°C	
	Wt. loss	T <sub>5%</sub>	Wt.	Tonset	Tmax	N2	Air
	%	°C	%	°C	°C	%	%
Undried granules of bio-PA1010	0.45	409.1	99.34	429.1	455.6	0.08	0.03
Dried granules of bio-PA1010	0.38	414.4	99.55	433.8	458.4	0.14	0.00
Dried bio-PA1010 injected in cold mold	0.48	409.5	99.33	430.9	455.8	0.04	0.00
Dried bio-PA1010 injected in hot mold	0.45	412.6	99.42	433.3	457.6	0.24	0.05

### *Raman analysis data*

**Table S2. Tables containing Raman intensities ratios specific to bio-PA1010 filled with LDH and C500, respectively.**

bio-PA1010 with LDH untreated	bio-PA1010 with LDH 80°C	bio-PA1010 with LDH 145°C
$I_{1433}/I_{1633} = 1.823$	$I_{1433}/I_{1633} = 1.585$	$I_{1433}/I_{1633} = 1.235$
$I_{1433}/I_{650} = 2.058$	$I_{1433}/I_{650} = 1.367$	$I_{1433}/I_{650} = 0.732$
$I_{2846}/I_{1633} = 0.791$	$I_{2846}/I_{1633} = 0.581$	$I_{2846}/I_{1633} = 0.1645$
$I_{2885}/I_{1633} = 0.758$	$I_{2885}/I_{1633} = 0.557$	$I_{2885}/I_{1633} = 0.157$
$I_{2846}/I_{650} = 0.89$	$I_{2846}/I_{650} = 0.51$	$I_{2846}/I_{650} = 0.097$
$I_{2885}/I_{650} = 0.853$	$I_{2885}/I_{650} = 0.481$	$I_{2885}/I_{650} = 0.093$
$I_{850}/I_{650} = 1.175$	$I_{850}/I_{650} = 1.02$	$I_{850}/I_{650} = 0.919$
$I_{1053}/I_{1633} = 1.265$	$I_{1053}/I_{1633} = 1.303$	$I_{1053}/I_{1633} = 1.3715$
$I_{1053}/I_{650} = 1.423$	$I_{1053}/I_{650} = 1.124$	$I_{1053}/I_{650} = 0.8132$

bio-PA1010 with C500 untreated	bio-PA1010 with C500 at 80°C	bio-PA1010 with C500 at 145°C
$I_{1433}/I_{1633} = 1.08$	$I_{1433}/I_{1633} = 0.995$	$I_{1433}/I_{1633} = 1.29$
$I_{1433}/I_{650} = 2.15$	$I_{1433}/I_{650} = 2.068$	$I_{1433}/I_{650} = 2.02$
$I_{2846}/I_{1633} = 3.936$	$I_{2846}/I_{1633} = 1.901$	$I_{2846}/I_{1633} = 0.519$
$I_{2885}/I_{1633} = 3.831$	$I_{2885}/I_{1633} = 1.7960$	$I_{2885}/I_{1633} = 0.431$
$I_{2846}/I_{650} = 7.815$	$I_{2846}/I_{650} = 3.718$	$I_{2846}/I_{650} = 0.816$
$I_{2885}/I_{650} = 7.606$	$I_{2885}/I_{650} = 3.732$	$I_{2885}/I_{650} = 0.677$
$I_{850}/I_{650} = 1.082$	$I_{850}/I_{650} = 1.228$	$I_{850}/I_{650} = 1.082$
$I_{1053}/I_{1633} = 0.733$	$I_{1053}/I_{1633} = 0.724$	$I_{1053}/I_{1633} = 0.842$
$I_{1053}/I_{650} = 1.456$	$I_{1053}/I_{650} = 1.505$	$I_{1053}/I_{650} = 1.323$