

## Supporting Information

# Insight into the melt processed Polylimonene oxide/Polylactic acid blends

Miguel Palenzuela,<sup>a</sup> Juan F. Vega,<sup>b,c</sup> Virginia Souza-Egipsy,<sup>b</sup> Javier Ramos,<sup>b,c</sup> Christian Rentero,<sup>a</sup> Sessini Valentina<sup>a\*</sup> and Marta E. G. Mosquera<sup>a\*</sup>

<sup>a</sup>Departamento de Química Orgánica y Química Inorgánica, Instituto de Investigación Química "Andrés M. del Río". Campus Universitario, E-28871 Alcalá de Henares, Spain.

<sup>b</sup>BIOPHYM, Departamento de Física Macromolecular, Instituto de Estructura de la Materia, IEM-CSIC, c/Serrano 113 bis, 28006 Madrid, Spain.

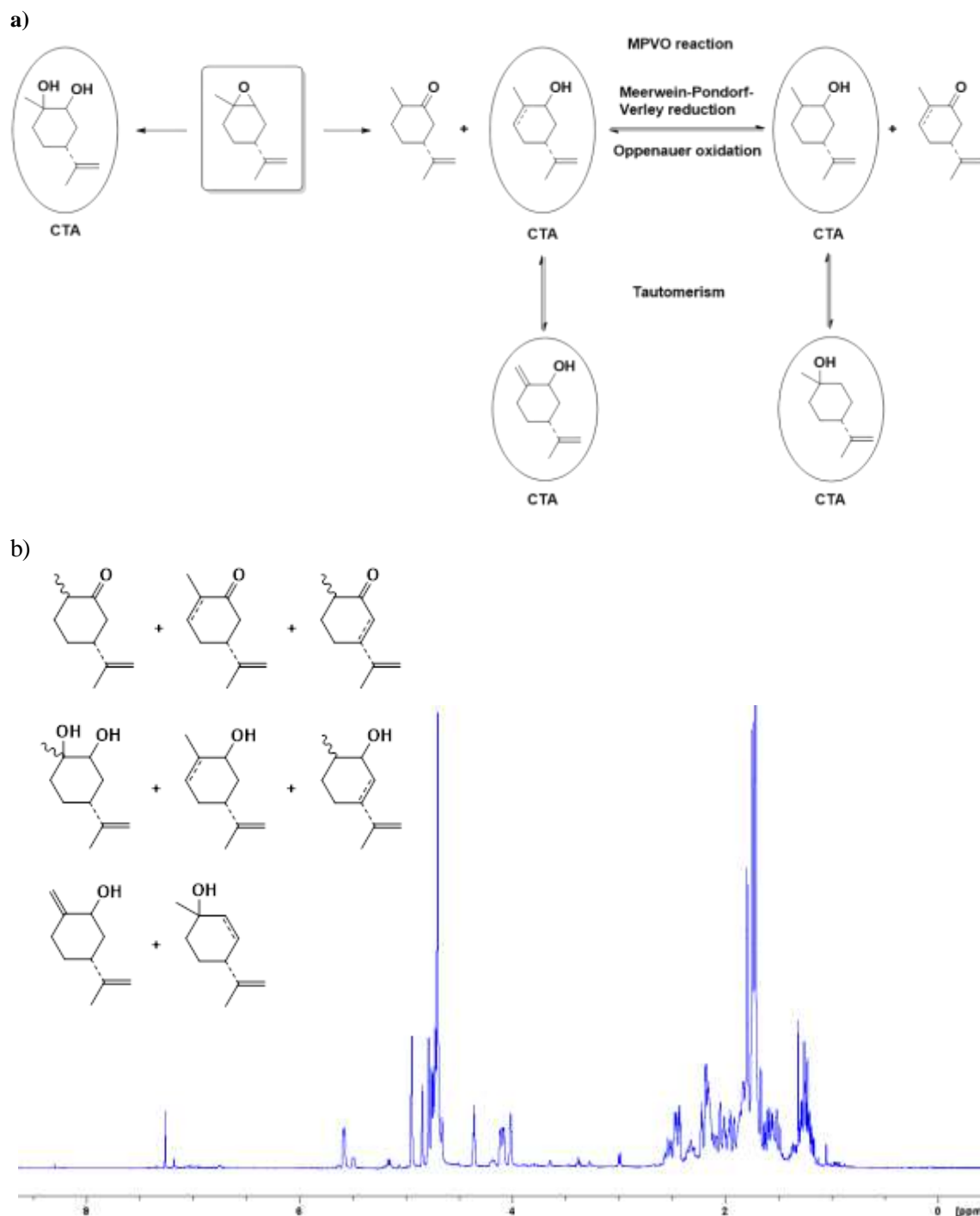
<sup>c</sup>Interdisciplinary Platform for Sustainable Plastics towards a Circular Economy, SUSPLAST-CSIC, 28006 Madrid, Spain.

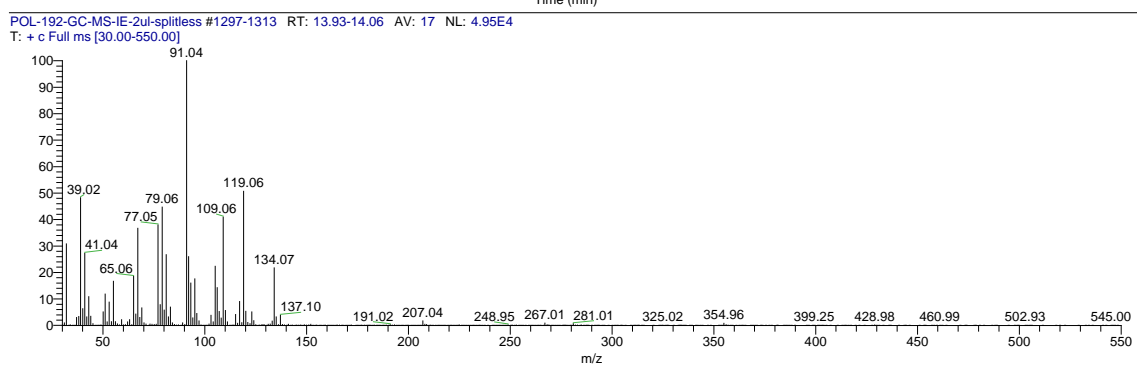
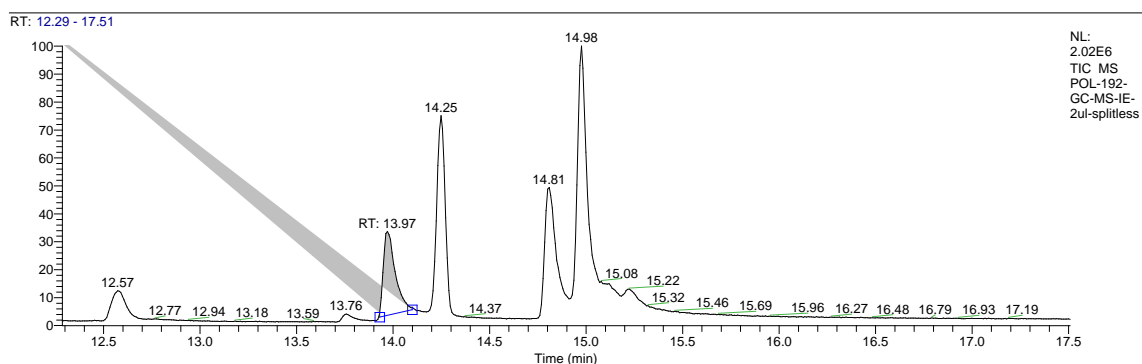
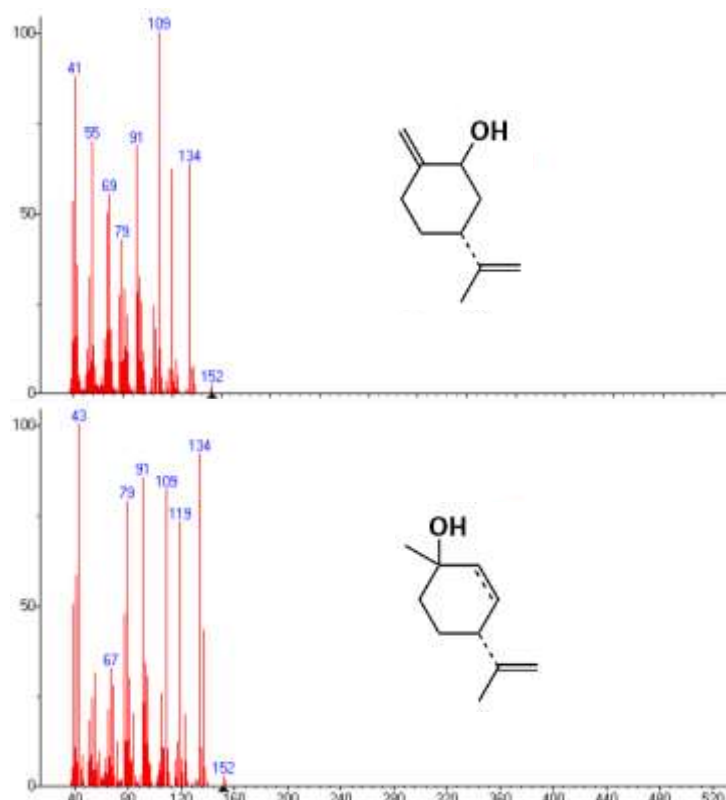
Corresponding Author e-mail: [valentina.sessini@uah.es](mailto:valentina.sessini@uah.es), [martaeg.mosquera@uah.es](mailto:martaeg.mosquera@uah.es)

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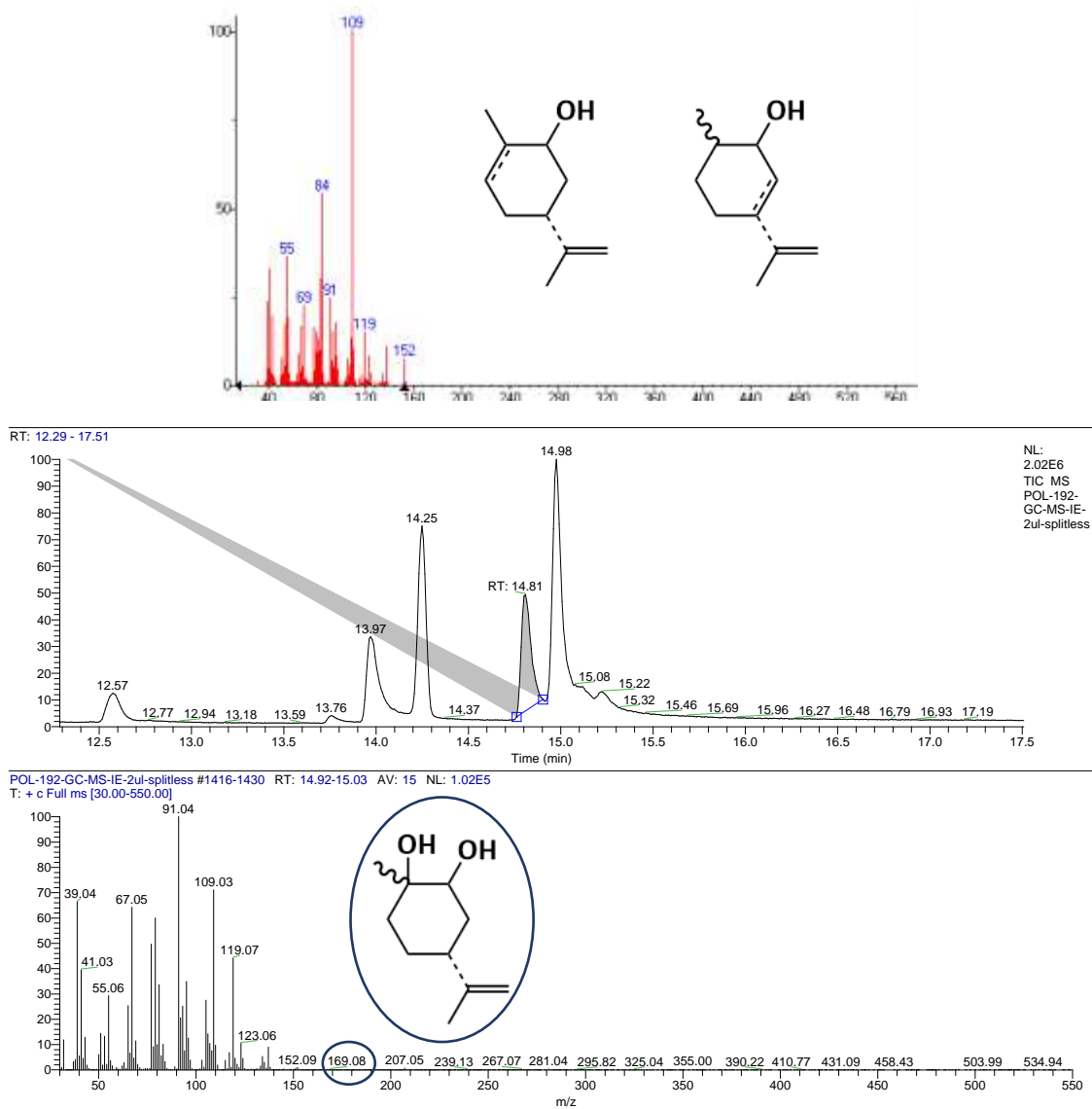
- 1. Characterization of LO rearrangement products by GC-MS**
- 2. NMR spectra**
- 3. Isothermal TGA**

# 1. Characterization of LO rearrangement products by GC-MS

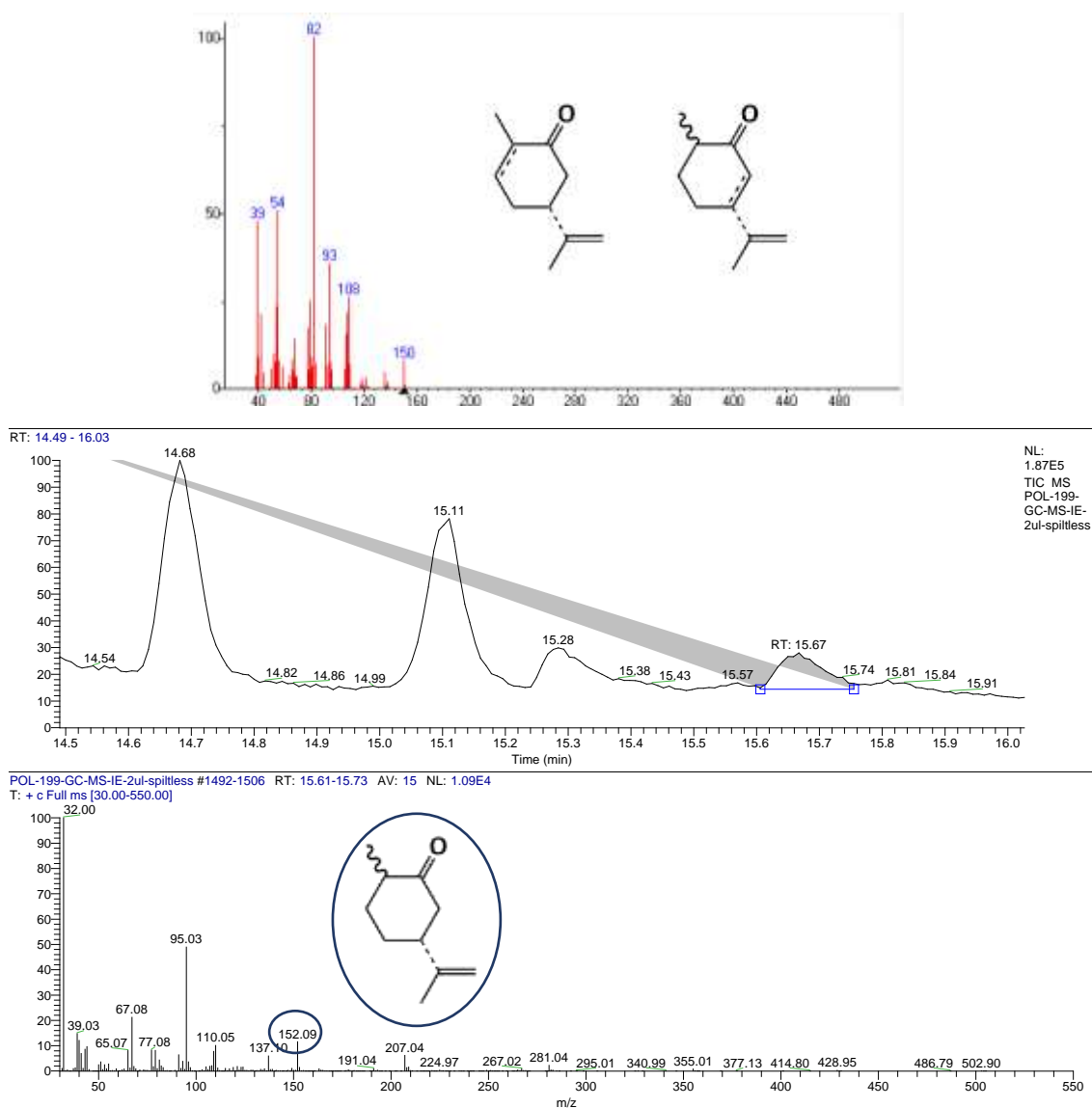




**Figure S2.** GC-MS of LO alcohol derivatives present in the filtrate of the ROP reaction of LO with catalysts **1**.

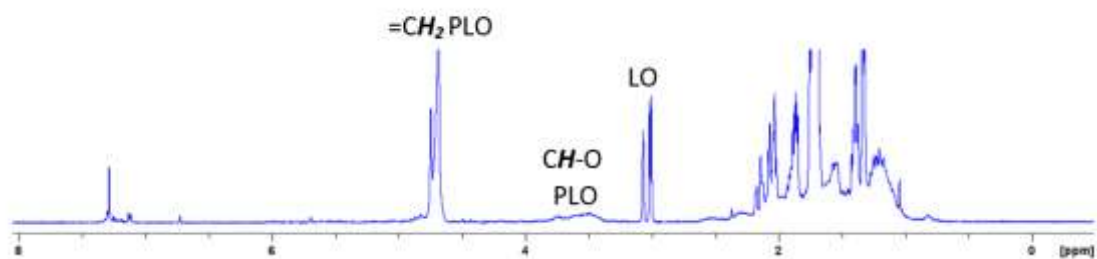


**Figure S3.** GC-MS of LO alcohol derivatives present in the filtrate of the ROP reaction of LO with catalysts **1**.

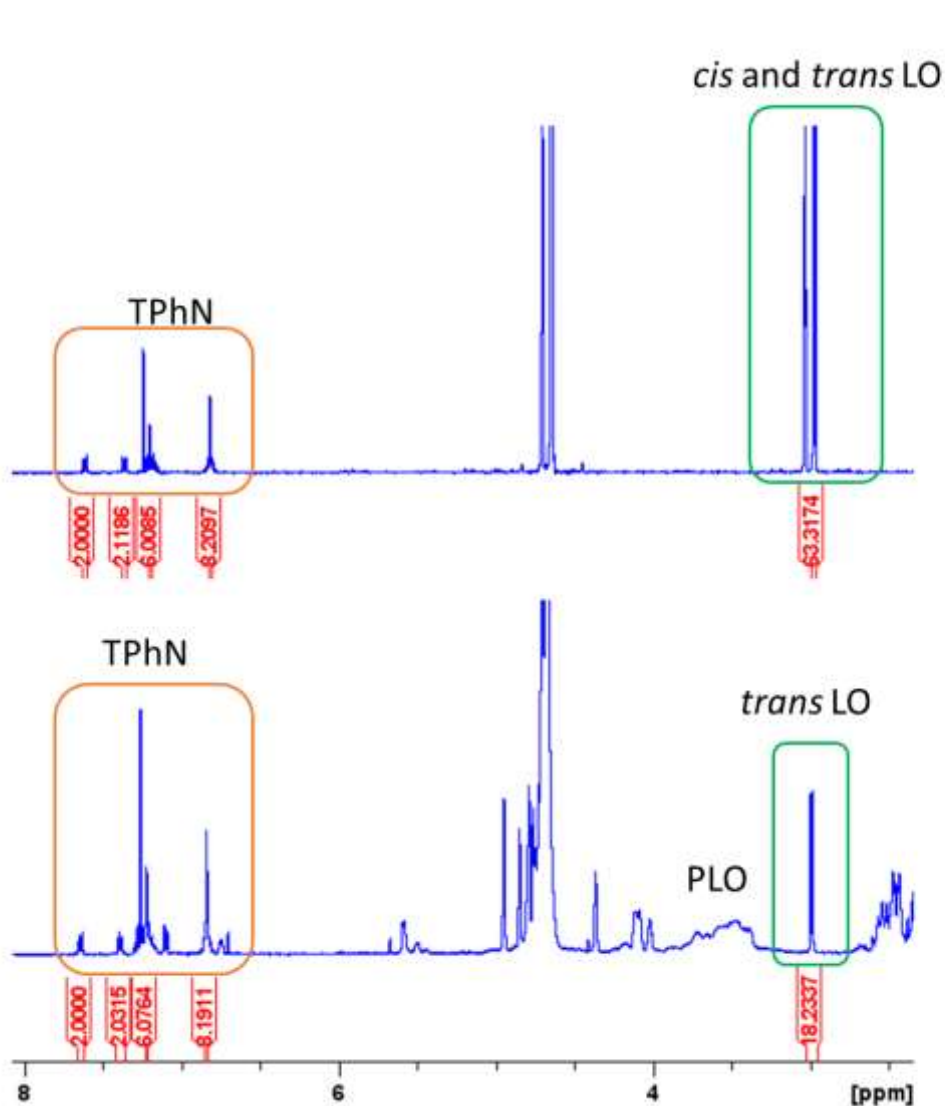


**Figure S4.** GC-MS of LO ketone derivatives present in the filtrate of the ROP reaction of LO with catalysts **1**.

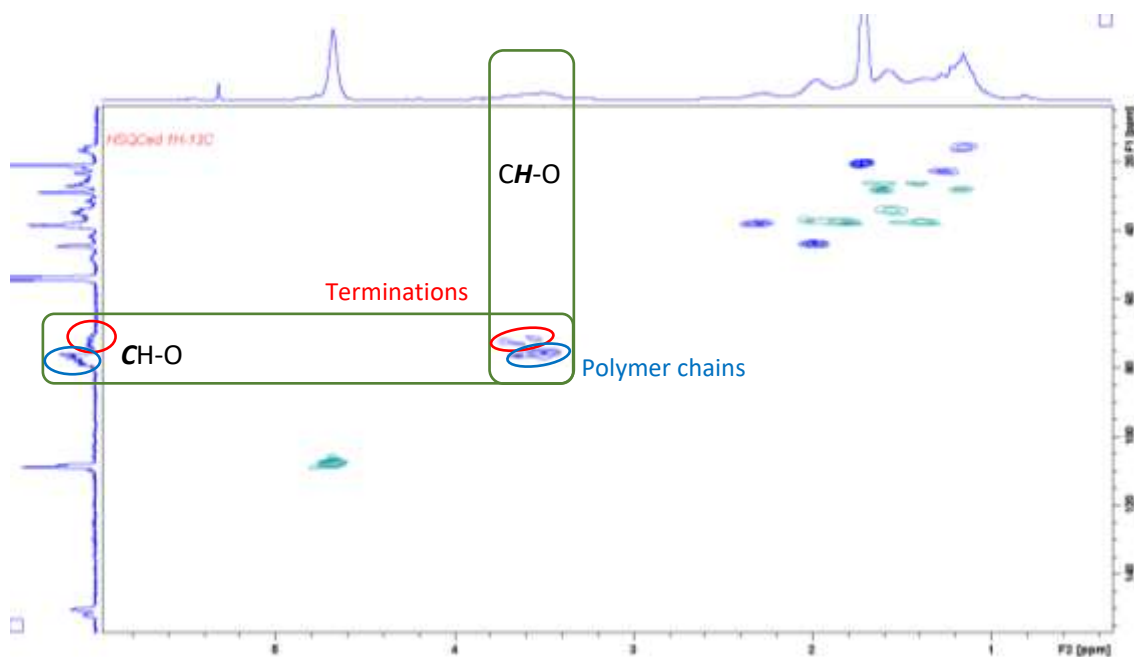
## 2. NMR spectra



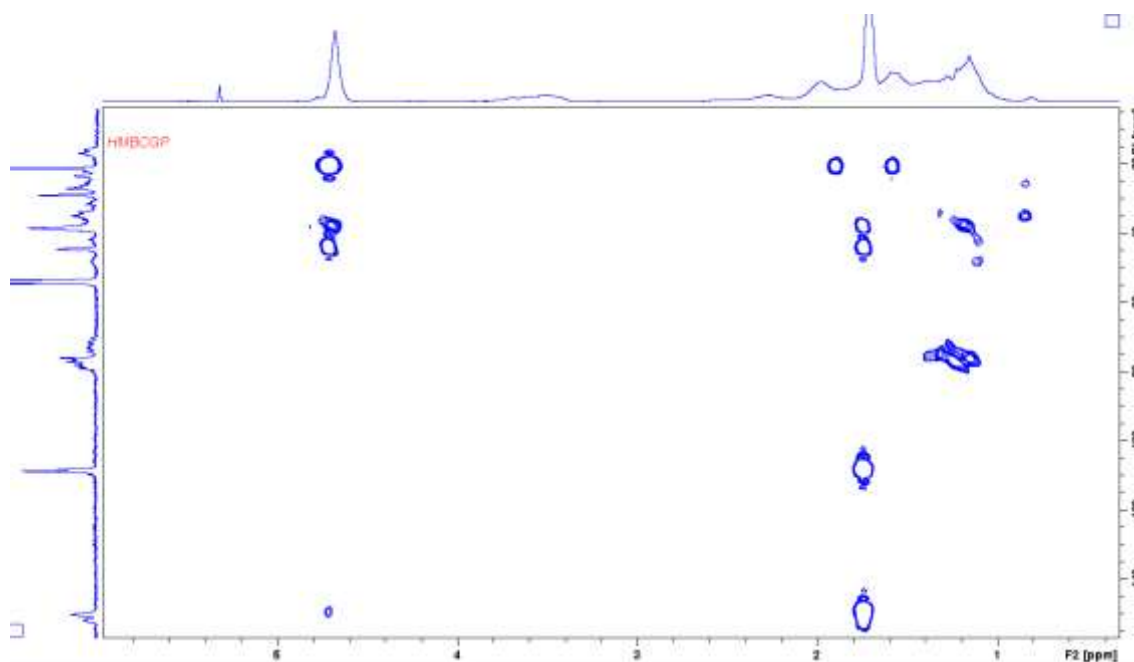
**Figure S5.** <sup>1</sup>H-NMR spectrum of an aliquot of the reaction of 250 equivalents of LO in bulk at RT.



**Figure S6.** <sup>1</sup>H-NMR spectra in CDCl<sub>3</sub> of the reaction carried out with a [Al]:TPhN:LO ratio of 1:2:250 in bulk at 130 °C. (Top: before addition of catalyst; bottom: t=30 min)

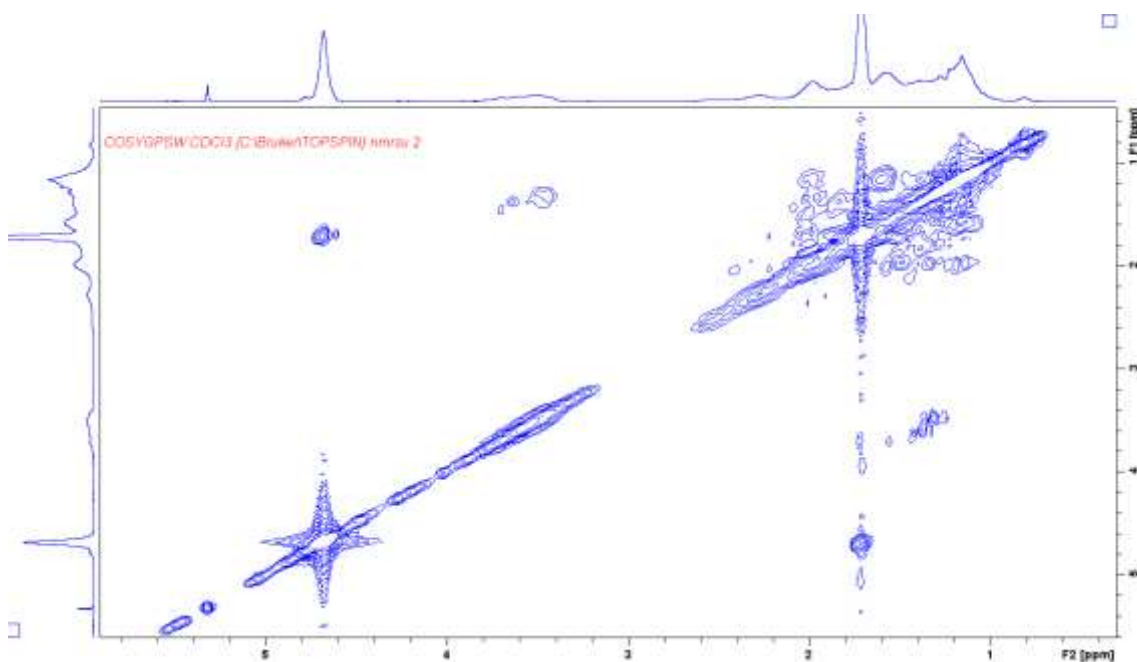


**Figure S7.** HSQCed  $^1\text{H}$ - $^{13}\text{C}$ -NMR spectrum of PLO ( $\text{CD}_2\text{Cl}_2$ , 400 MHz, RT).

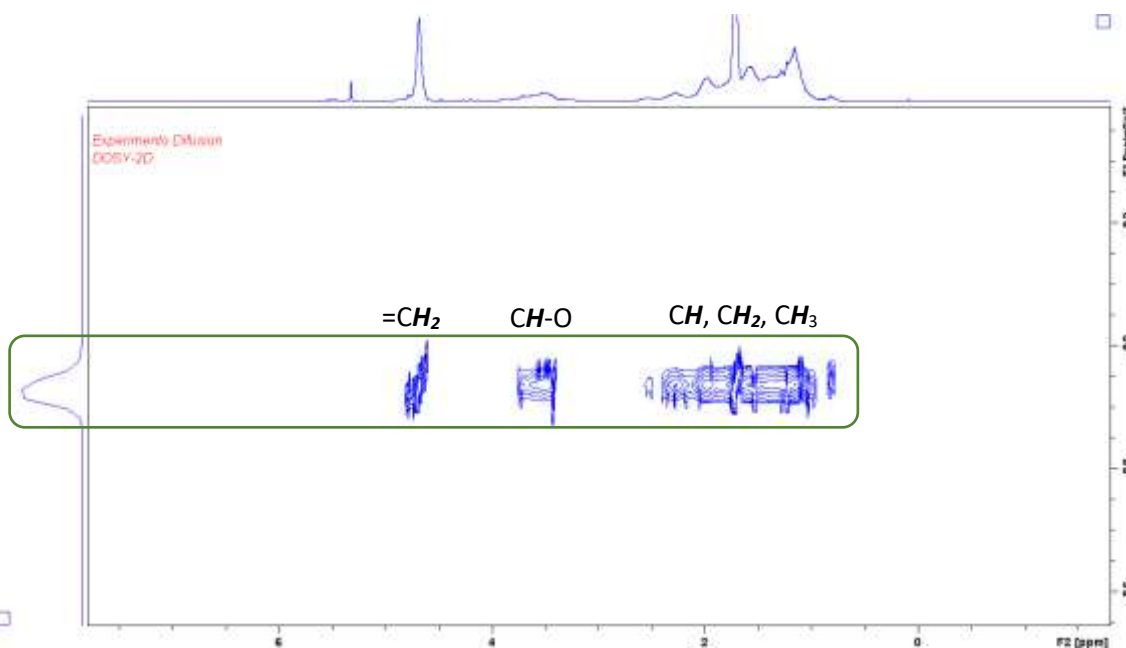


**Figure S8.** HMBC  $^1\text{H}$ - $^{13}\text{C}$ -NMR spectrum of PLO ( $\text{CD}_2\text{Cl}_2$ , 400 MHz, RT)





**Figure S9.** COSY  $^1\text{H}$ - $^1\text{H}$ -NMR spectrum of PLO ( $\text{CD}_2\text{Cl}_2$ , 400 MHz, RT).



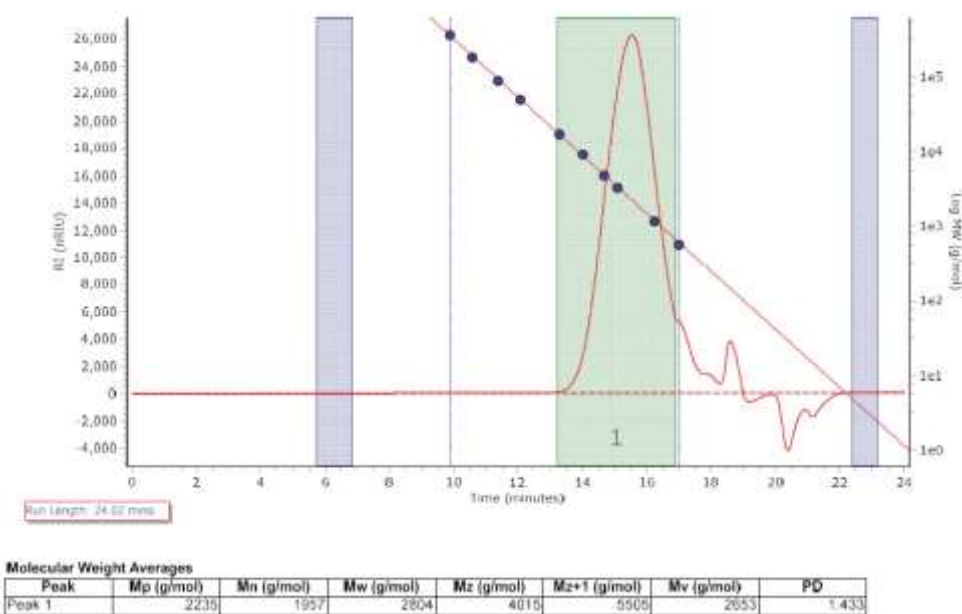
**Figure S10.** DOSY 2D NMR spectrum of PLO ( $\text{CD}_2\text{Cl}_2$ , 400 MHz, RT).

**Table S1.** Experiments of ROP of LO with catalysts 1 and 2.

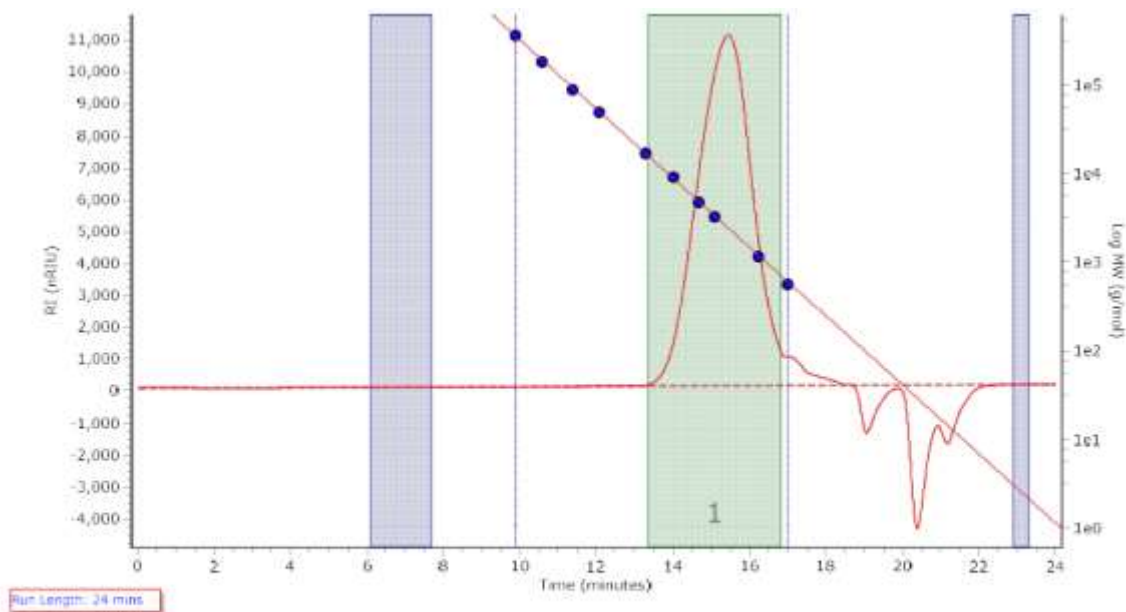
Ent.	[Al]	[Al]:[LO]	T (°C)	%Conv. cis/trans-LO <sup>a</sup>	% Yield PLO
1	1	1:100	130	>99 / 70	28
2	1	1:100	25	94 / 83	54
3	1	1:250	130	>99 / 70	28
4	1	1:250	25	80 / 67	60
5	2	1:100	130	>99 / 70	28
6	2	1:100	25	91 / 78	60
7	2	1:250	130	>99 / 70	28
8	2	1:250	25	77 / 62	58

<sup>a</sup> Determined by <sup>1</sup>H-NMR spectroscopy.

### 3. GPC traces of polymers



**Figure S11.** GPC traces of PLO obtained with **1** at RT

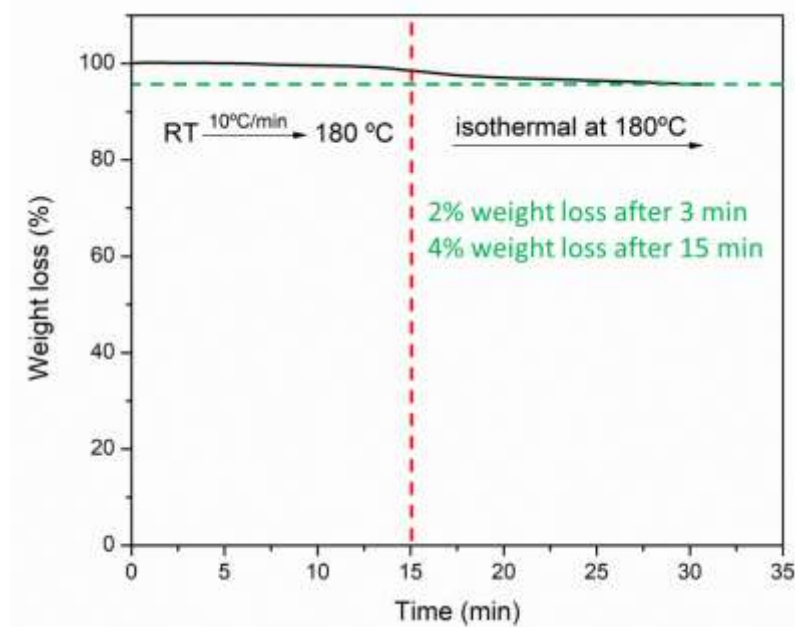


**Molecular Weight Averages**

Peak	Mp (g/mol)	Mn (g/mol)	Mw (g/mol)	Mz (g/mol)	Mz+1 (g/mol)	Mv (g/mol)	PD
Peak 1	2415	2265	3112	4257	5612	2965	1.374

**Figure S12.** GPC traces of PLO obtained with **2** at RT

**4. Isothermal analysis under air atmosphere**



**Figure S13.** Isothermal TGA scan at 180°C under air flow.