

## Electronic Supplementary Information

for

### **Ethylene-norbornene-1-octene terpolymers with high 1-octene content, molar masses, tunable $T_g$ values, in high yield by half-titanocene catalysts**

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### Determination of termonomer content.

On the basis of the peak intensity of carbons in the  $^{13}\text{C}$  NMR spectra it was possible to estimate the content of norbornene, ethylene, and 1-octene in the terpolymers. The composition of poly(E-*ter*-N-*ter*-O) was calculated according to the following equations:

$$\text{N (mol- \%)} = \frac{[\text{N}]}{[\text{N}] + [\text{E}] + [\text{O}]} \times 100 = \frac{\bar{I}_{\text{N}}}{\bar{I}_{\text{N}} + \bar{I}_{\text{E}} + \bar{I}_{\text{O}}} \times 100 \quad (1)$$

$$\text{O (mol- \%)} = \frac{[\text{O}]}{[\text{N}] + [\text{E}] + [\text{O}]} \times 100 = \frac{\bar{I}_{\text{O}}}{\bar{I}_{\text{N}} + \bar{I}_{\text{E}} + \bar{I}_{\text{O}}} \times 100 \quad (2)$$

$$\bar{I}_{\text{N}} = \frac{1}{2} I_{2/3} \quad (3)$$

$$\bar{I}_{\text{E}} = \frac{1}{2} (I_{\text{CH}_2} - 2\bar{I}_{\text{N}} - 3\bar{I}_{\text{O}}) \quad (4)$$

$$\bar{I}_{\text{O}} = I_{1\text{B}_6} \quad (5)$$

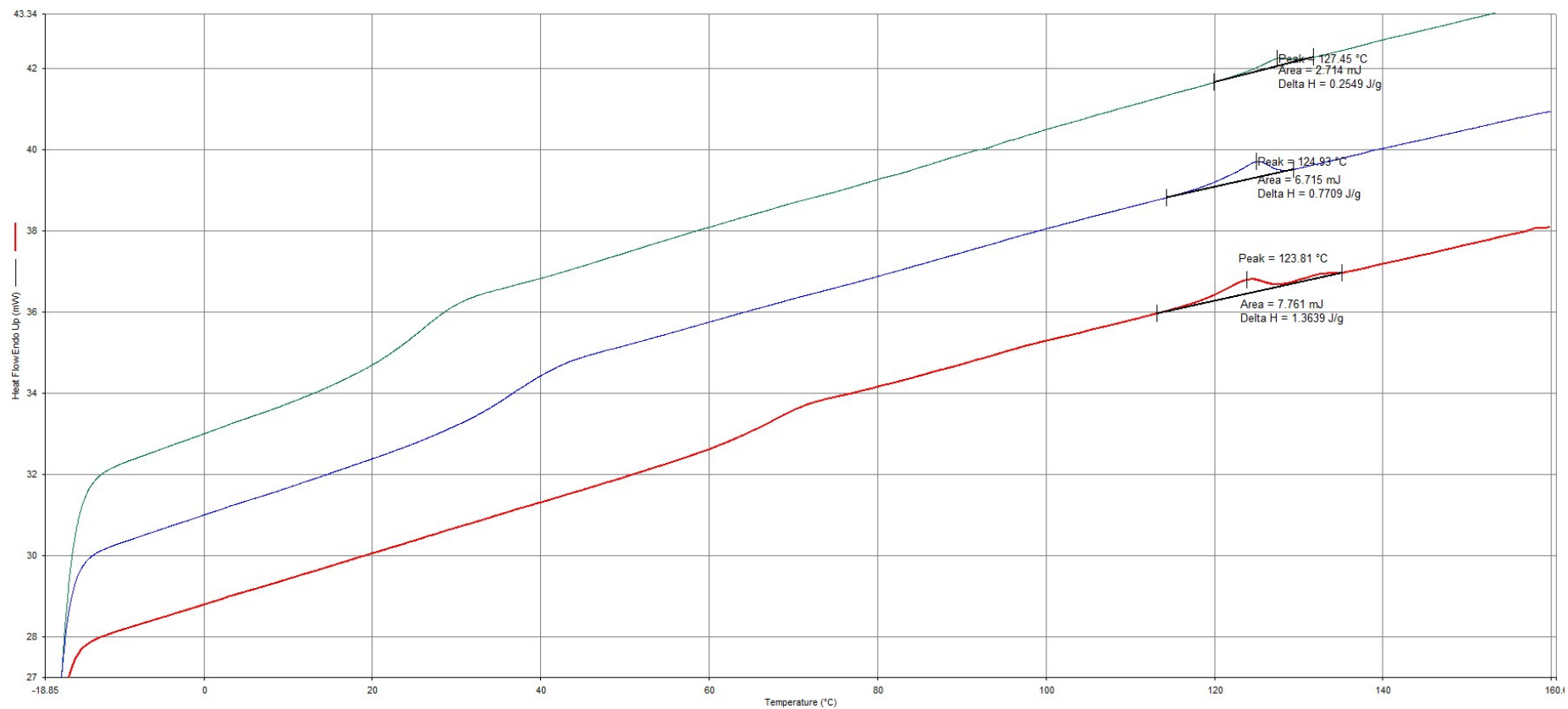
where  $I_{2/3}$  is the peak intensity of the methine carbons C2/C3 in the norbornene units,  $I_{\text{CH}_2}$  is the total area of peaks from 30.6 to 24.3 ppm, and  $I_{1\text{B}_6}$  indicates the peak intensity of the methyl carbon 1B<sub>6</sub> in the 1-octene unit.

**Table 1S.**  $^1\text{H}$  NMR data of the olefinic chain ends in the investigated terpolymers.<sup>a</sup>

Structure	Short name	$^1\text{H}$ NMR (ppm)	Structure	Short name	$^1\text{H}$ NMR (ppm)
	<b>Vy-1</b>	a: 4.86 – 4.93 d: 5.62		<b>Vy-2</b>	a: 4.84 – 4.89 d: 5.39
	<b>E-1</b>	b: 5.03 c: 5.22		<b>E-2</b>	b: 5.08 c: 5.24
	<b>E-3</b>	b: 5.03 c: 5.22		<b>E-4</b>	c: 5.28 – 5.32
	<b>E-5</b>	c: 5.29 – 5.32		<b>E-6</b>	c: 5.33
	<b>E-7</b>	c: 5.32			
	<b>N-1</b>	e: 5.50		<b>N-2</b>	b: 5.31
	<b>O-1</b>	b: 5.10		<b>O-2</b>	b: 5.08
	<b>O-3</b>	b: 5.07		<b>O-4</b>	f: 4.63
	<b>O-5</b>	f: 4.68			

<sup>a</sup> Chemical shifts are those observed in the spectra of the terpolymers of this study, while assignments were made on the base of ref 47.

Figure 1S. DSC Curves of Entries 4, 5, and 6 prepared by catalysts 2.

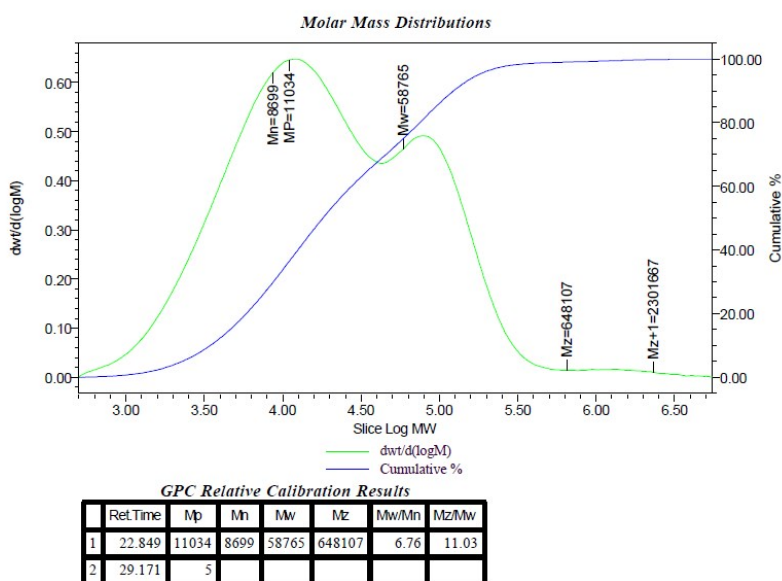


- Entry 4
- Entry 5
- Entry 6

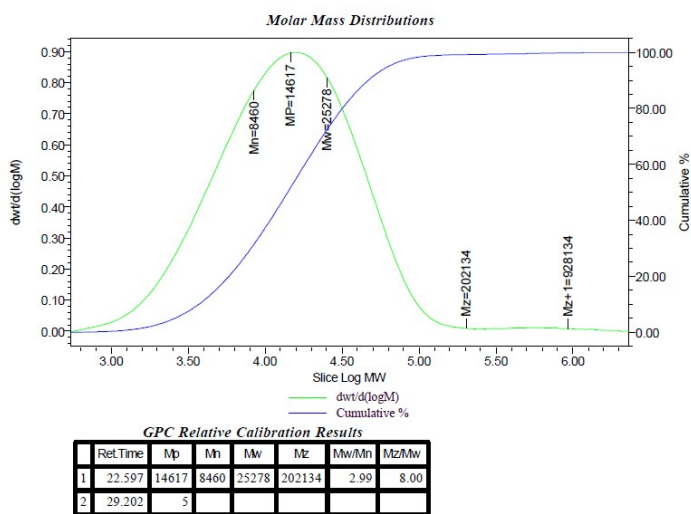


Figure 2S. GPC Curves of Entries 1, 2, and 3 prepared by catalysts 1

### Entry 1



### Entry 2



### Entry 3

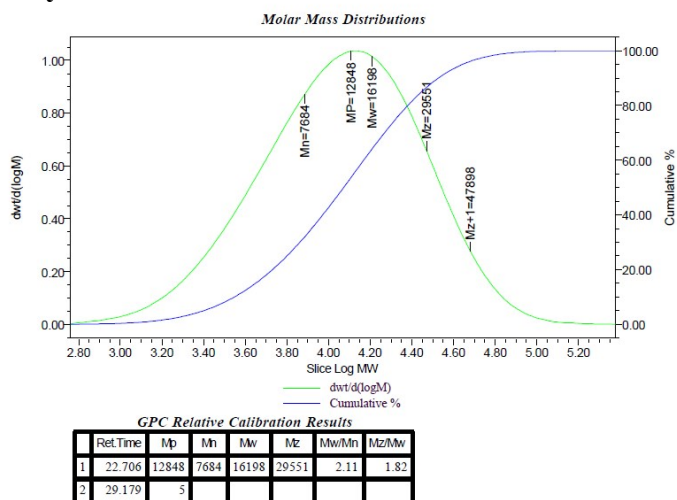
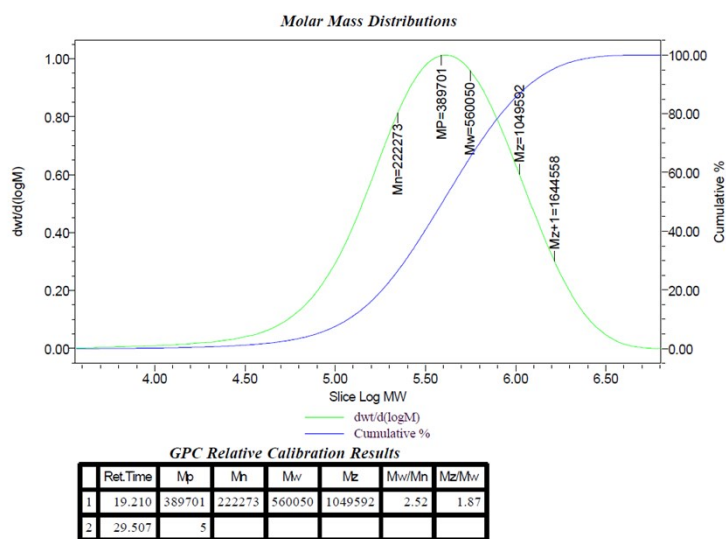
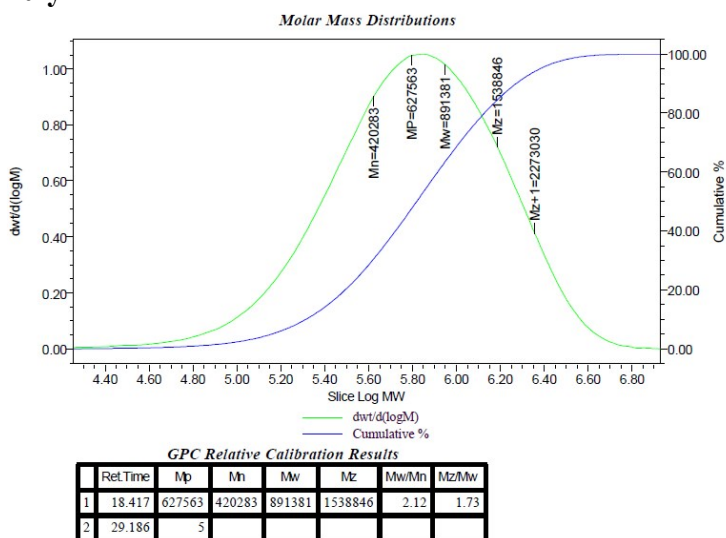


Figure 3S. GPC Curves of Entries 10, 11, and 12 prepared by catalysts 2

### Entry 10



### Entry 11



### Entry 12

