

Synthesis and Characterization of a Block Copolymer Syndiotactic Polystyrene-*b*-Polyethylene

David Hermann Lamparelli ¹, Vito Speranza ², Isabella Camurati ³,

Antonio Buonerba ^{1,*} and Leone Oliva ^{1,*}

^a Dipartimento di Chimica e Biologia “*Adolfo Zambelli*”, Università degli Studi di Salerno, via Giovanni Paolo II, 84084 Fisciano (SA), Italy.

^b Dipartimento di Ingegneria Industriale, Università degli Studi di Salerno, Via Giovanni Paolo II, 84084 Fisciano (SA), Italy.

* Correspondence: A.B.: abuonerba@unisa.it and L.O. loliva@unisa.it

Table of Contents

1. NMR Analysis.....	S3
Figure S1. ^{13}C NMR spectra (*TCE- d_2 ; 70 °C) of polymer fractions deriving from the synthetic procedure adopted for the isolation of sPS- <i>b</i> -PE copolymer: a) crude reaction product; b) hexane soluble fraction; c) toluene insoluble fraction; d) toluene soluble fraction.	S3
Figure S2. ^1H - ^1H COSY NMR spectrum of sPS- <i>b</i> -PE (a) with magnification (b) of the diagnostic region for polymer terminals and E-S junction (* TCE- d_2 ; 70 °C; # toluene trace impurity).....	S4
Figure S3 ^1H - ^{13}C HSQC NMR spectrum of sPS- <i>b</i> -PE (a) with magnification (b) of the diagnostic region for polymer terminals and E-S junction (* TCE- d_2 ; 70 °C; # toluene trace impurity).....	S5
Figure S4. DOSY NMR spectra of: a) sPS- <i>b</i> -PE; b) sPS- <i>b</i> -PE (diffusion coefficient = $9.3 \cdot 10^{-12} \pm 2.7 \cdot 10^{-13} \text{ m}^2\text{s}^{-1}$) in presence of a PS standard (42.6 kDa; $M_w/M_n = 1.04$; diffusion coefficient = $9.4 \cdot 10^{-12} \pm 2.9 \cdot 10^{-13} \text{ m}^2\text{s}^{-1}$).	S6
2. SEC Analysis	S7
Figure S5. SEC curves the polymer fraction: a) soluble in hexane; b) insoluble in toluene; c) soluble in toluene (* front of solvent).....	S7
3. WAXD Analysis.....	S8
Figure S6. WAXD diffractogram of the sPS- <i>b</i> -PE copolymer after extraction with supercritical carbon dioxide.....	S8
Figure S7. WAXD diffractogram of the sPS- <i>b</i> -PE copolymer after treatment at 170 °C for 30 min.	S8
4. TM-AFM Analysis	S9
Figure S8. Height (on the left) and phase (on the right) TM-AFM micrographs of thin film crude reaction product coming from the synthetic procedure of sPS- <i>b</i> -PE copolymer.....	S9

1. NMR Analysis

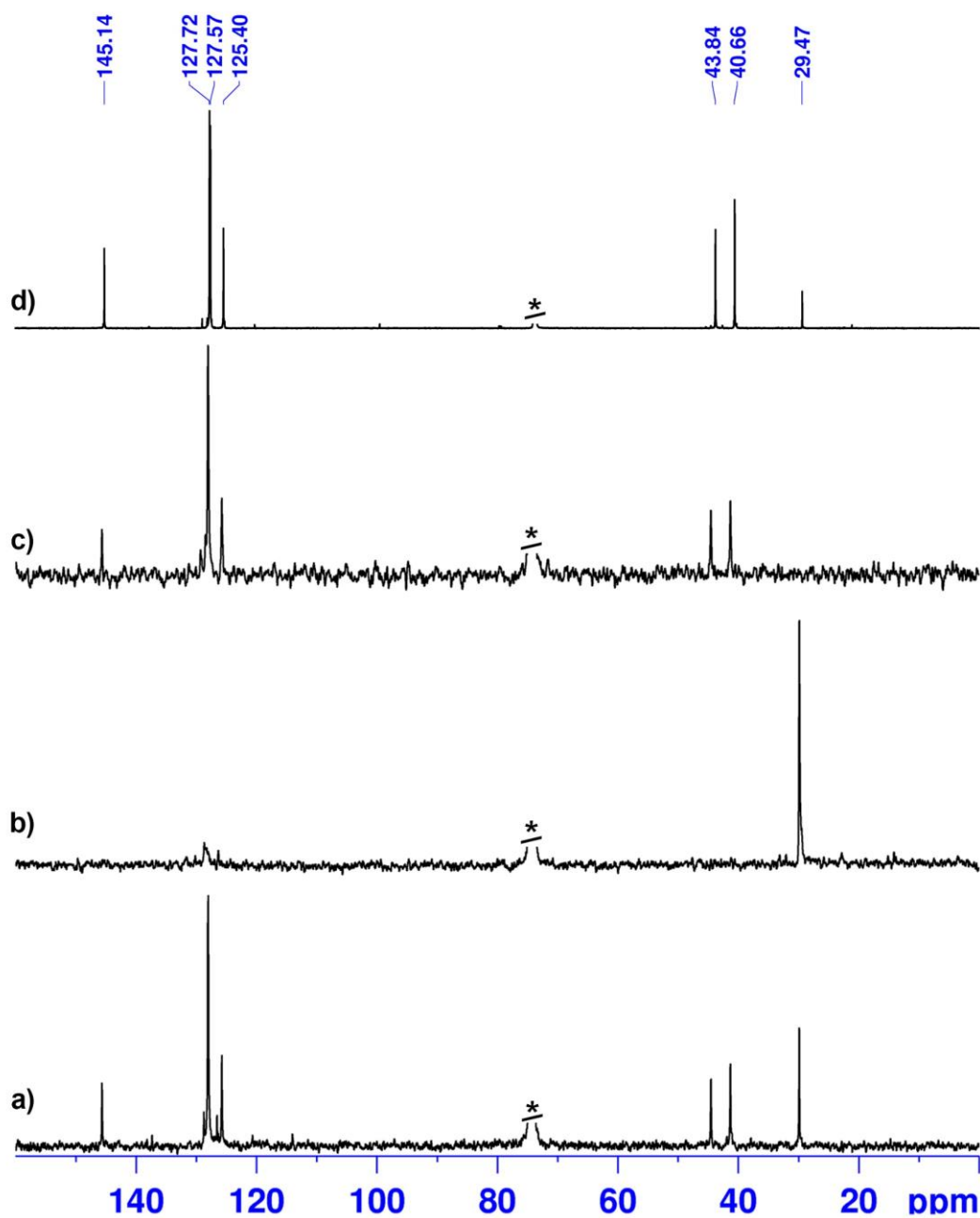
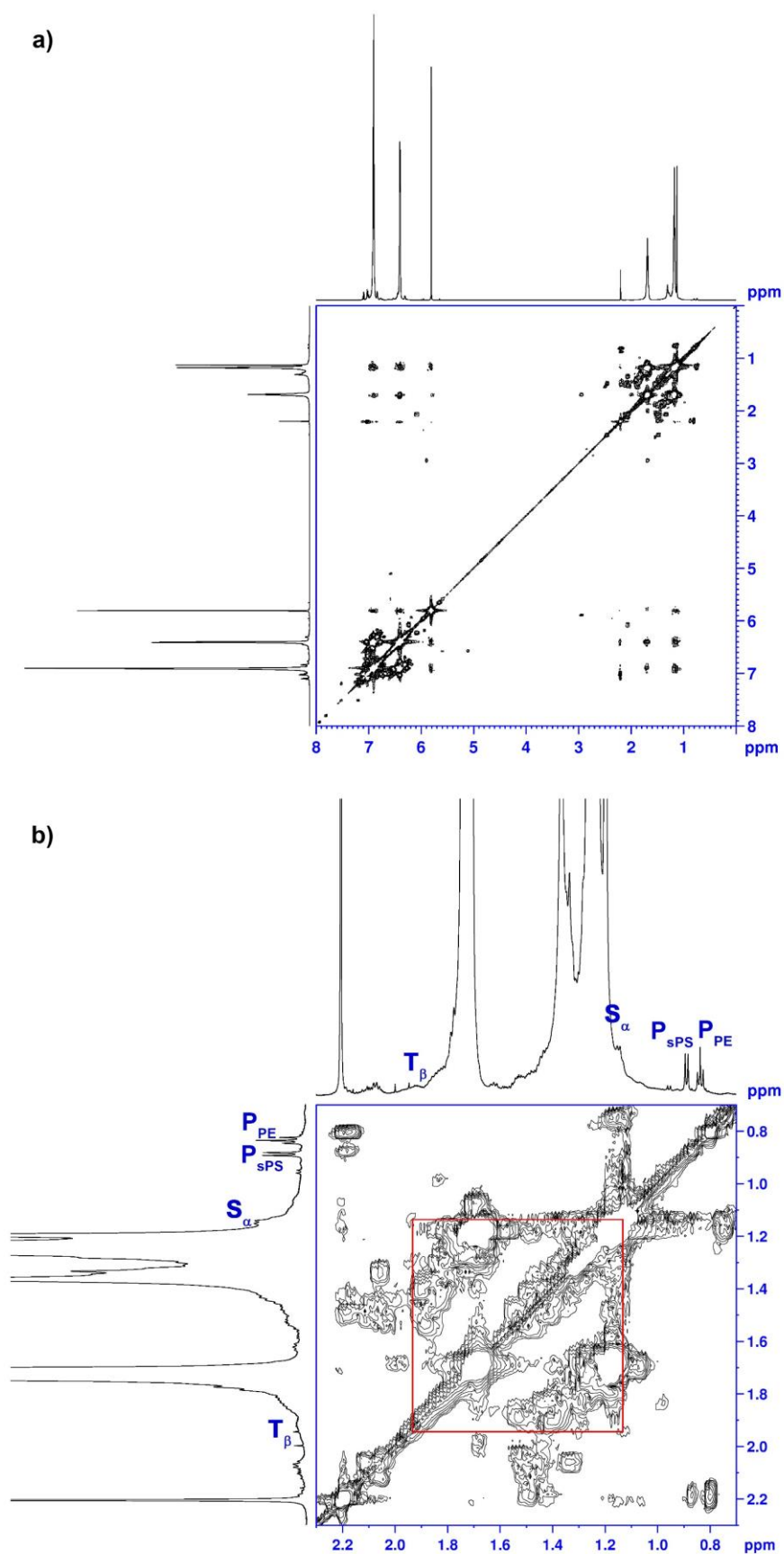


Figure S1. ^{13}C NMR spectra (*TCE- d_2 ; 70 $^{\circ}\text{C}$) of polymer fractions deriving from the synthetic procedure adopted for the isolation of sPS-*b*-PE copolymer: a) crude reaction product; b) hexane soluble fraction; c) toluene insoluble fraction; d) toluene soluble fraction.



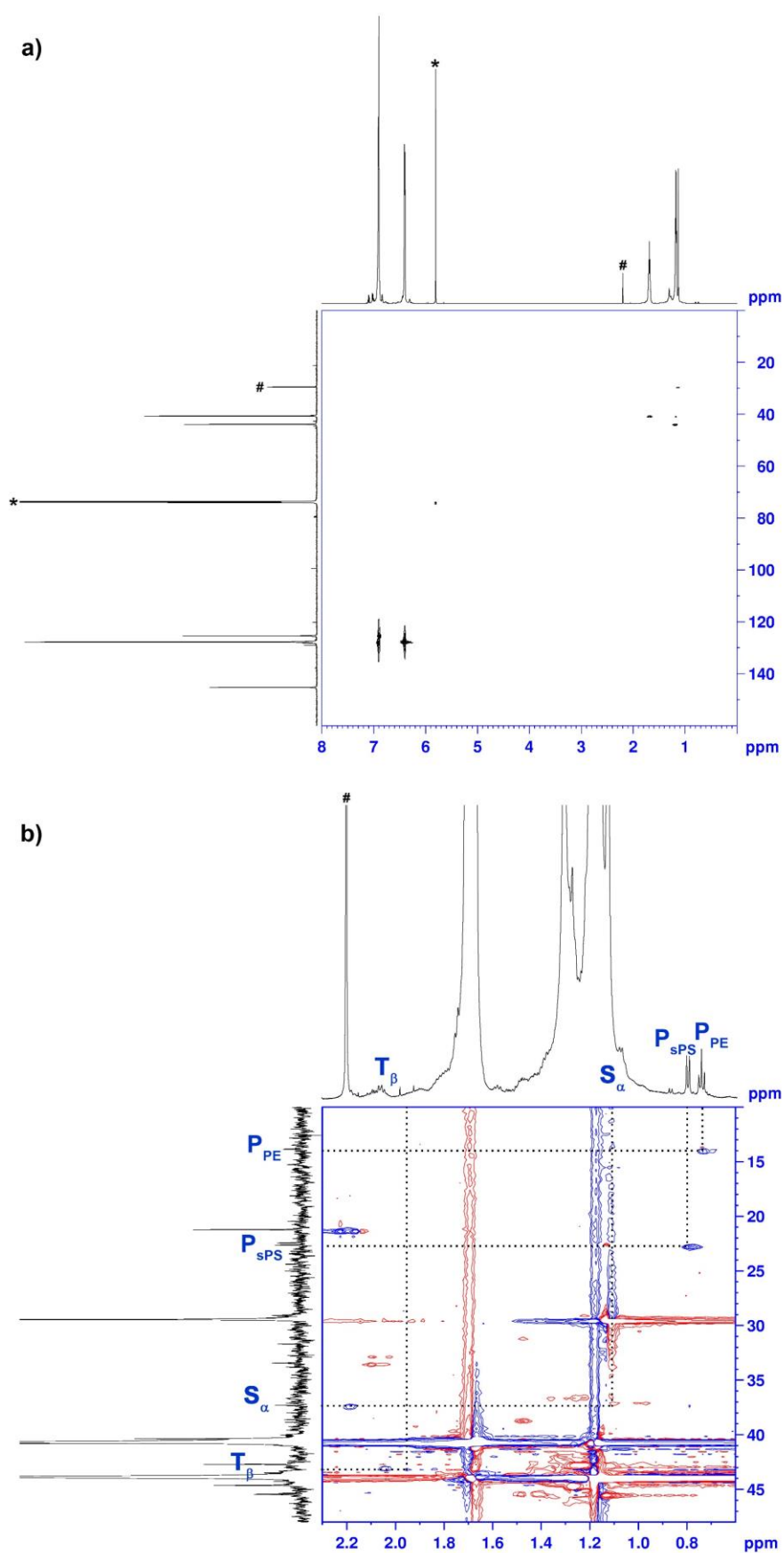


Figure S3 ^1H - ^{13}C HSQC NMR spectrum of sPS-*b*-PE (a) with magnification (b) of the diagnostic region for polymer terminals and E-S junction (* TCE- d_2 ; 70 °C; # toluene trace impurity).

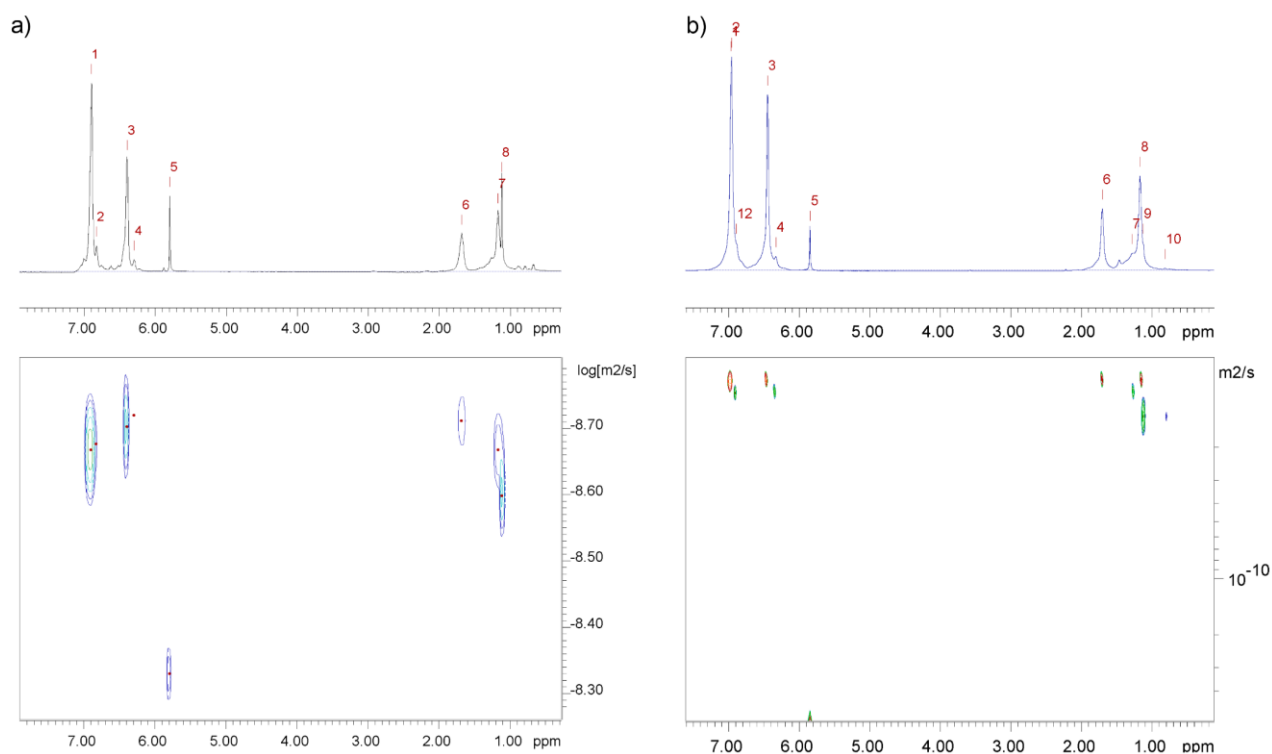


Figure S4. DOSY NMR spectra of: a) sPS-*b*-PE; b) sPS-*b*-PE (diffusion coefficient = $9.3 \cdot 10^{-12} \pm 2.7 \cdot 10^{-13} \text{ m}^2/\text{s}$) in presence of a PS standard (42.6 kDa; $M_w/M_n = 1.04$; diffusion coefficient = $9.4 \cdot 10^{-12} \pm 2.9 \cdot 10^{-13} \text{ m}^2/\text{s}$).

2. SEC Analysis

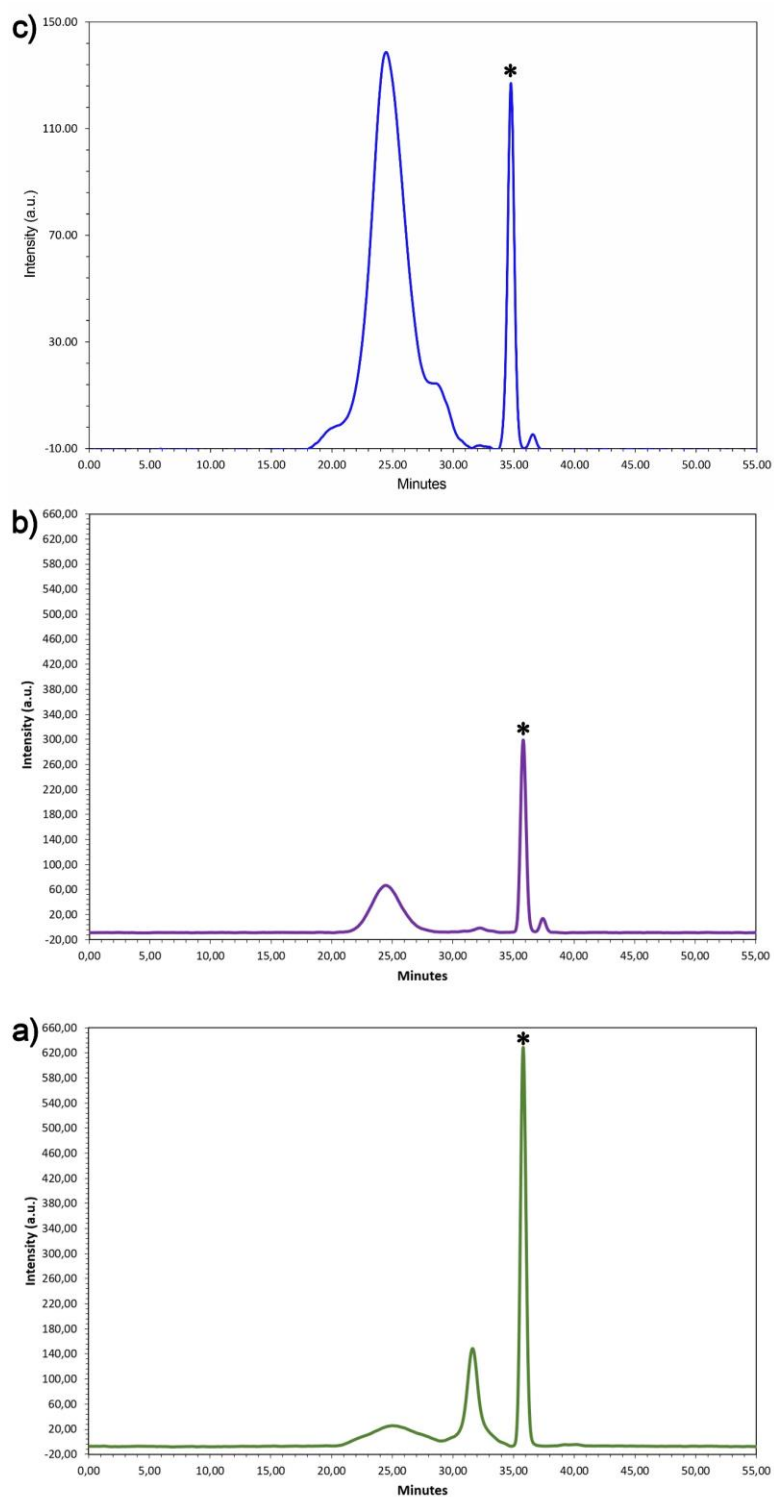


Figure S5. SEC curves the polymer fraction: a) soluble in hexane; b) insoluble in toluene; c) soluble in toluene (* front of solvent).

3. WAXD Analysis

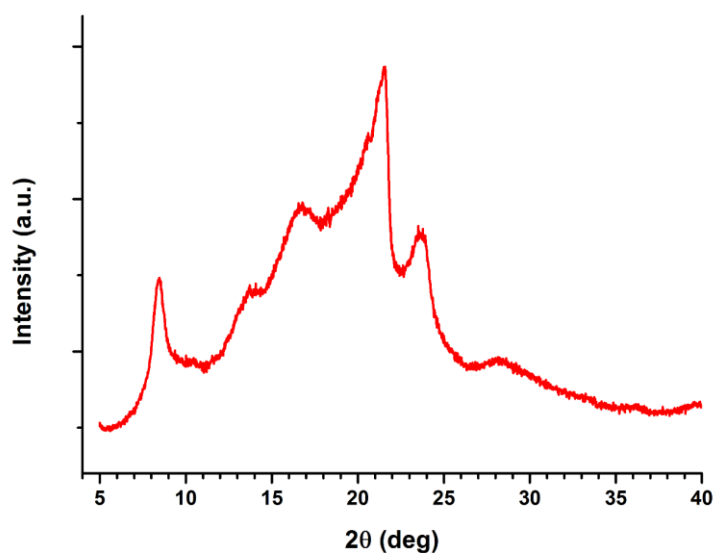


Figure S6. WAXD diffractogram of the sPS-*b*-PE copolymer after extraction with supercritical carbon dioxide.

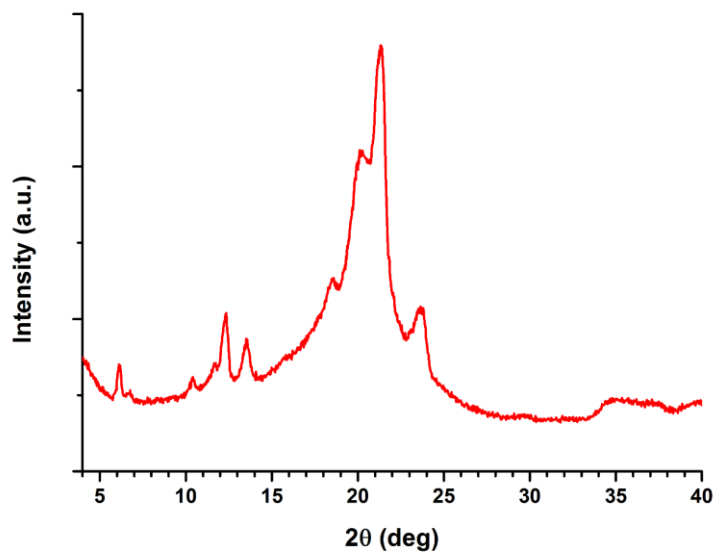


Figure S7. WAXD diffractogram of the sPS-*b*-PE copolymer after treatment at 170 °C for 30 min.

4. TM-AFM Analysis

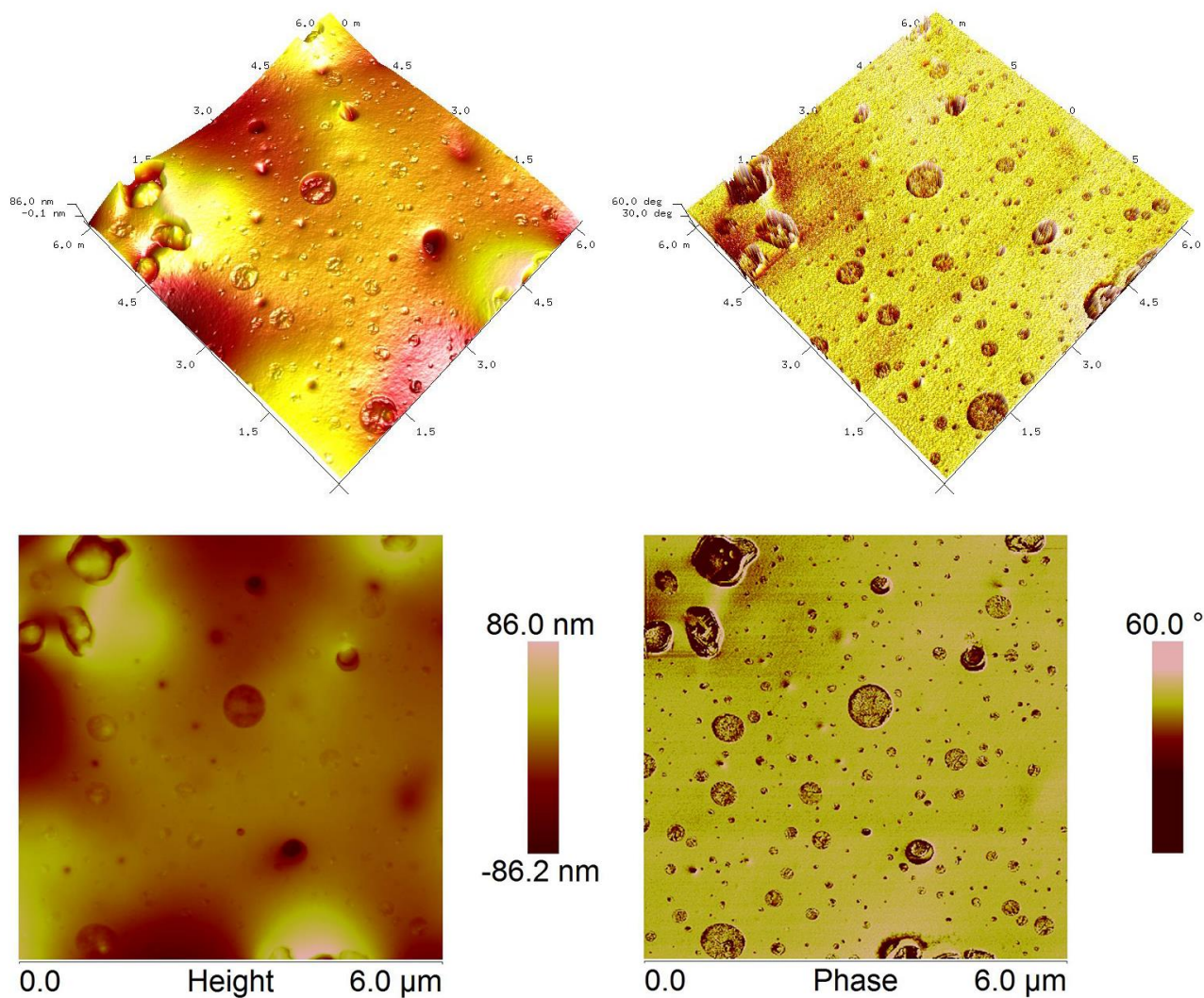


Figure S8. Height (on the left) and phase (on the right) TM-AFM micrographs of thin film crude reaction product coming from the synthetic procedure of sPS-*b*-PE copolymer.