Electronic Supplementary Material (ESI) for Soft Matter
This journal is © The Royal Society of Chemistry 2013

Precise structural investigation of a symmetric diblock copolymer thin films with resonant soft X-Ray reflectivity

Wei Ma,[1, a)] Boris Vodungbo,[1] Katja Nilles,[2] Patrick Theato,[2, 3, 4] and Jan Luning[1, 5]

[1)] *LCP-MR, UPMC Paris 06, CNRS UMR 7614, 11 Rue P. et M. Curie, 75005 Paris, France*

[2)] *Institut fur Organische Chemie, Universitat Mainz, Duesbergweg 10-14, D-55099 Mainz, Germany*

[3)] *School of Chemical and Biological Engineering, WCU Program of Chemical Convergence for Energy and Environment (C_2E_2), College of Engineering, Seoul National University, Seoul, Korea*

[4)] *Institute for Technical and Macromolecular Chemistry, University of Hamburg, Bundesstrasse 45, D-20146 Hamburg, Germany*

[5)] *Synchrotron SOLEIL, B.P. 48, 91192 Gif-sur-Yvette, France*

(Dated: 25 June 2013)

[a)] Electronic mail: msewma@gmail.com

Electronic Supplementary Material (ESI) for Soft Matter
This journal is © The Royal Society of Chemistry 2013

Supporting Information

TABLE I. Fitting results for PS-b-PAEES thin films with $3.5L_0$ thickness

	Model	capplayer (PS)	3 repetitions		Buffer (PAEES)	Substrate (Si)
			PAEES	PS		
250 eV	Thickness(Å)	99.3±2.1	201.1±2.3	195.9±2.2	101.9±2.2	**
	Roughness(Å)	15.0±2.0	18.6±6.3	21.1±6.8	14.0±7.3	4.9±0.5
275 eV	Thickness(Å)	102.4±2.0	205.5±2.1	197.3±2.2	108.7 ±2.3	**
	Roughness(Å)	7.0±1.8	21.4±3.3	22.5±3.8	20.8±2.9	6.7±1.3
280.6 eV	Thickness(Å)	107.8±2.0	206.5±2.1	199.1±2.3	115.6±2.0	**
	Roughness(Å)	8.5±1.9	20.6±2.1	20.0±2.1	20.9±2.0	5.9±1.3
281.6 eV	Thickness(Å)	107.9±2.0	206.8±1.8	199.1±1.9	115.6±2.0	**
	Roughness(Å)	10.5±2.3	21.2±2.0	20.2±2.1	20.8±1.9	5.9±1.5
283.6 eV	Thickness(Å)	96.1±1.7	204.1±1.5	198.1±1.8	105.1±1.9	**
	Roughness(Å)	9.8±1.5	18.8±1.4	21.7±1.4	21.5±1.5	3.5±1.3
284.6 eV	Thickness(Å)	96.1±1.3	201.1±1.2	195.1±1.3	105.1 ±1.1	**
	Roughness(Å)	9.9 ±0.9	18.8±1.1	21.7±1.2	21.5±1.3	3.3±0.8
284.9 eV	Thickness(Å)	96.1±0.9	201.1±0.8	195.1±0.9	105.1±0.9	**
	Roughness(Å)	9.7 ±1.0	18.7±0.8	21.7±0.9	21.5±0.7	3.3±1.0
285.1 eV	Thickness(Å)	97.1±1.0	198.1±1.1	192.1±1.2	105.1±0.8	**
	Roughness(Å)	8.2±0.8	18.7 ±0.7	21.7±0.6	21.5±0.7	6.3±0.6
286.1 eV	Thickness(Å)	102.2±0.9	202.1±0.8	198.1±0.8	107.3±0.7	**
	Roughness(Å)	9.9±0.5	18.7±0.6	21.7±0.4	21.5±0.6	3.7±0.7
286.6 eV	Thickness(Å)	104.2±1.1	205.1±1.2	200.1±1.3	109.1±1.2	**
	Roughness(Å)	9.9±0.4	18.7 ±0.5	21.7 ±0.6	21.5±0.7	5.3±0.5
287.6 eV	Thickness(Å)	100.2±1.2	204.1±1.1	197.1±1.2	106.1±1.3	**
	Roughness(Å)	9.9±0.7	18.7±0.8	21.7±0.9	21.5±0.7	5.3±0.6

This journal is © The Royal Society of Chemistry 2013

TABLE II. Fitting results for PS-b-PAEES thin films with $4.5L_0$ thickness

Model		capplayer (PS)	4 repetitions		Buffer (PAEES)	Substrate (Si)
			PAEES	PS		
250 eV	Thickness(Å)	96.7±2.1	200.2±2.3	186.8±2.2	101.1±2.2	**
	Roughness(Å)	20.2 ±2.0	23.6±6.3	23.5±6.8	29.3±7.3	9.9±0.5
283.6 eV	Thickness(Å)	96.1±1.8	202.1±1.7	197.1 ±1.6	97.1±1.5	**
	Roughness(Å)	9.8±1.5	18.8±1.5	21.7±1.4	21.5±1.3	3.5±1.3
284.6 eV	Thickness(Å)	96.1±1.3	202.1±1.1	196.1±1.0	103.1±1.1	**
	Roughness(Å)	9.9±1.0	18.8 ±1.1	21.7±1.3	21.5 ±1.0	3.3±1.2
284.9 eV	Thickness(Å)	96.1±0.9	201.1 ±0.8	196.1 ±1.0	107.1±0.8	**
	Roughness(Å)	9.7±0.8	18.7 ±0.8	21.7±0.9	21.5±0.7	3.3±0.8
285.1 eV	Thickness(Å)	97.1±0.6	198.1±0.8	194.1±0.9	102.1±1.0	**
	Roughness(Å)	6.9±0.9	18.7 ±0.8	21.7±0.8	21.5±0.6	6.3±0.5
286.1 eV	Thickness(Å)	99.2±0.9	201.1±1.1	197.1±1.2	104.3±0.9	**
	Roughness(Å)	9.9±0.5	18.7±0.6	21.7 ±0.4	21.5±0.6	3.7±0.5
286.6 eV	Thickness(Å)	99.2±1.2	201.1±1.3	195.1±1.3	105.1±1.4	**
	Roughness(Å)	9.9±0.9	18.7 ±0.7	21.7±0.8	21.5 ±0.8	5.4±0.7
287.6 eV	Thickness(Å)	97.2±1.4	204.1 ±1.3	200.1±1.5	100.1±1.6	**
	Roughness(Å)	9.9 ±0.7	18.7 ±0.9	21.7±0.8	21.5±0.9	5.3±1.0

This journal is © The Royal Society of Chemistry 2013

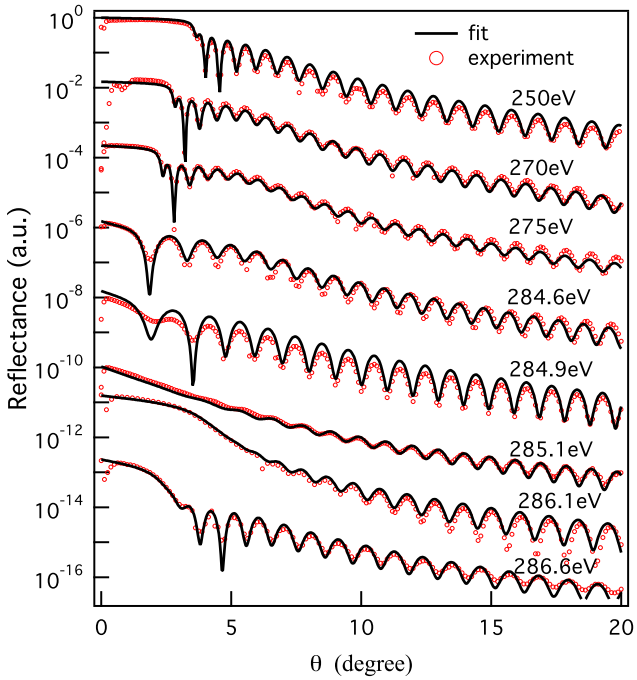

FIG. 1. Experimental and fit results for PS thin films at resonant energies

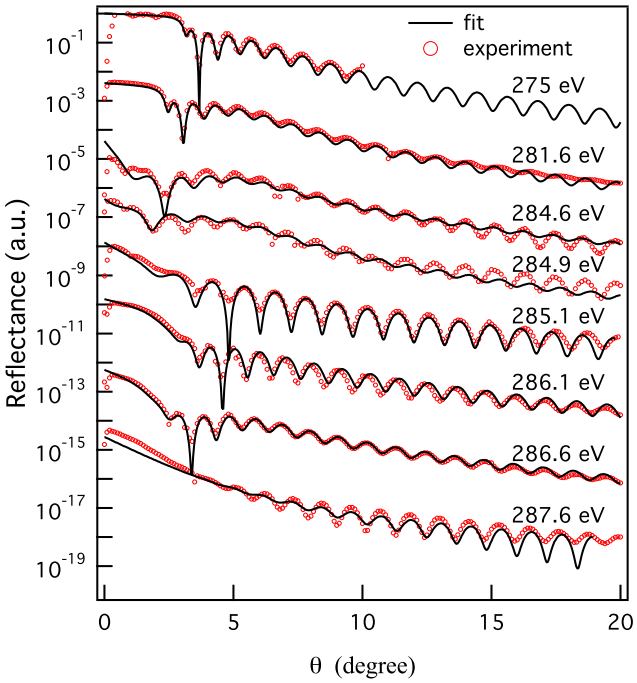

FIG. 2. Experimental and fit results for PAEES thin films at resonant energies

This journal is © The Royal Society of Chemistry 2013

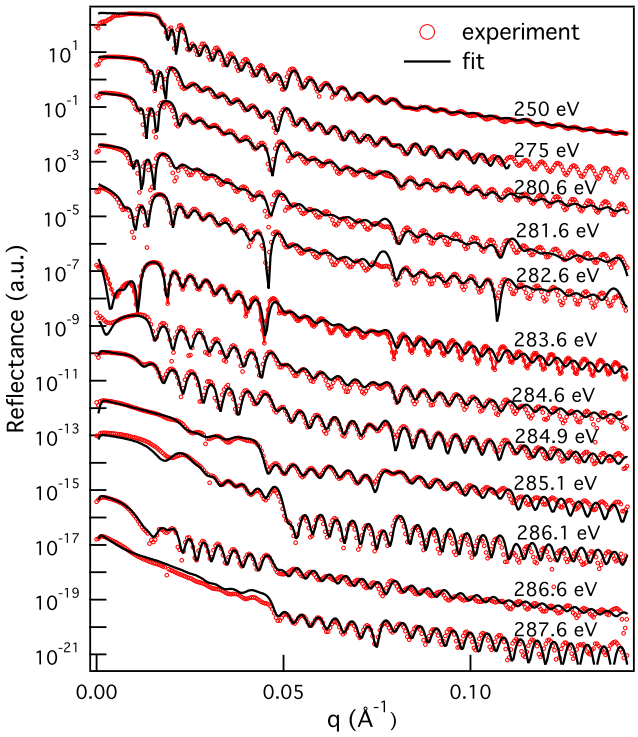

FIG. 3. Resonant soft x-ray reflectivity for PS-*b*-PAEES($3.5L_0$)

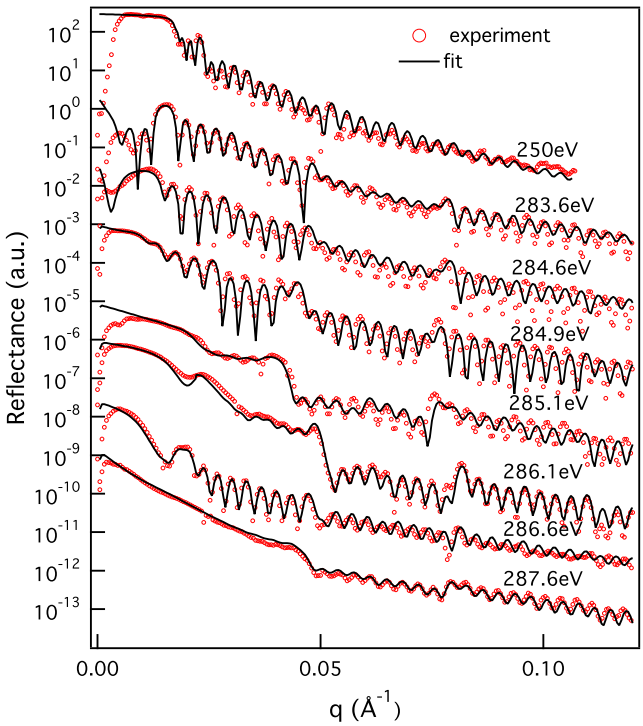

FIG. 4. Resonant soft x-ray reflectivity for PS-*b*-PAEES($4.5L_0$)