Structure-property relations of amphiphilic poly(furfuryl glycidyl ether)block-poly(ethylene glycol) macromonomers at the air-water interface

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Supporting information

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Table SI 1: Macromolecules used in the Langmuir film balance experiments. V_s is the spreaded volume of a 1 mg mL⁻¹ macromonomer stock solution in CHCl₃ and *n* is the amount of macromonomers.

sample	<i>V</i> ₅ [μL]	<i>n</i> [nmol]
PFGE ₁₀ - <i>b</i> -PEG ₉	80	36
PFGE ₁₁ - <i>b</i> -PEG ₁₆	20	7.45
PFGE ₁₁ - <i>b</i> -PEG ₂₆ H	20	6.65
PFGE ₁₁ - <i>b</i> -PEG ₂₆	20	6.40
PFGE ₈ - <i>b</i> -PEG ₇₉	10	2.00
PFGE ₁₈ - <i>b</i> -PEG ₆₆	7	1.11
PFGE ₁₃ -b-PEG ₁₁₁	10	1.39



Figure SI 1: ¹H NMR spectrum of macromonomer PFGE₁₀-*b*-PEG₉.



Figure SI 2: ¹H NMR spectrum of macromonomer PFGE₁₁-b-PEG₁₆.



Figure SI 3: ¹H NMR spectrum of PFGE₁₁-*b*-PEG₂₆H.



Figure SI 4: ¹H NMR spectrum of macromonomer PFGE₁₁-b-PEG₂₆.



Figure SI 5: Size exclusion chromatography traces of all studied macromonomers. $PFEG_{8}$ -b- PEG_{79} , $PFEG_{18}$ -b- PEG_{66} and $PFGE_{13}$ -b- PEG_{111} were already published.¹ The number average molecular weights (M_n), the weight average molecular weights (M_w) and the molar mass dispersity (D) of the macromonomers are summarized in Table 1.



Figure SI 6: Reproducibility of π -A isotherms of the studied macromonomers.



Figure SI 7: *π*-A isotherms of the studied macromonomers at different barrier speeds from 10 mm min⁻¹ to 50 mm min⁻¹.



Figure SI 8: Area at the π -A-isotherm onsets (A₀) of the studied macromonomers at different barrier speeds from 10 mm min⁻¹ to 50 mm min⁻¹.

Table SI 2: Amount surface coverage factor (Θ_n) and mass surface coverage factor (Θ_m) of the macromonomers used in this study.

sample	$\boldsymbol{\Theta}_n$ [pmol cm ⁻²]	$\boldsymbol{\Theta}_m$ [ng cm ⁻²]	
PFGE ₁₀ - <i>b</i> -PEG ₉	119 ± 14	266 ± 31	
PFGE ₁₁ - <i>b</i> -PEG ₁₆	28 ± 1	75 ± 1	
PFGE ₁₁ - <i>b</i> -PEG ₂₆ H	22 ± 4	65 ± 12	
PFGE ₁₁ - <i>b</i> -PEG ₂₆	25 ± 7	79 ± 22	
PFGE ₈ - <i>b</i> -PEG ₇₉	10 ± 1	48 ± 5	
PFGE ₁₈ - <i>b</i> -PEG ₆₆	10 ± 1	26 ± 1	
PFGE ₁₃ - <i>b</i> -PEG ₁₁₁	6 ± 1	43 ± 5	



Figure SI 9: Surface pressure drop ($\Delta \pi_d$) after 50 minutes of the studied macromonomers at constant trough area (A_c) with a starting surface pressure (π_0) of 5 mN m⁻¹.



Figure SI 10: Hysteresis and recovery cycles of the studied macromonomers in addition to the data given in Figure 4 for PFGE₈-b-PEO₇₉.



Figure SI 11: Linear fit of the hysteresis maxima surface pressures (π_{HM}) during hysteresis cycles of the studied macromonomers.

Table SI 3: Linear fit of the hysteresis maxima surface pressures (π_{HM}) during hysteresis cycles (c_{H}) of the studied macromonomers, absolute value of the respective slope (s_{HM}) and coefficient of determination (R^2).

sample	linear fit	S _{HM}	R ²
PFGE ₁₀ - <i>b</i> -PEG ₉	$\pi_{\rm HM}$ = -3.87c _H + 21.33	3.87	0.98873
PFGE ₁₁ - <i>b</i> -PEG ₁₆	$\pi_{\rm HM}$ = -2.25 c _H + 22.44	2.25	0.97180
PFGE ₁₁ - <i>b</i> -PEG ₂₆ H	π _{HM} = -2.15 c _H + 12.22	2.15	0.96029
PFGE ₁₁ - <i>b</i> -PEG ₂₆	$\pi_{\rm HM}$ = -2.00 c _H + 14.19	2.00	0.99039
PFGE ₈ - <i>b</i> -PEG ₇₉	$\pi_{\rm HM}$ = -1.40 c _H + 10.35	1.40	0.99926
PFGE ₁₈ - <i>b</i> -PEG ₆₆	$\pi_{\rm HM}$ = -1.63 c _H + 11.39	1.63	0.99264
PFGE ₁₃ - <i>b</i> -PEG ₁₁₁	π _{HM} = -1.27 c _H + 9.67	1.27	0.99965



Figure SI 12: Correlation of hysteresis decline with exposure time to compression and expansion forces of the studied macromonomers. s_{HM} is the slope of the surface pressure hysteresis maxima fit from Table SI 3. The lines are only for the guidance of the eyes.

References

1. K. K. Adatia, S. Keller, T. Götz, G. E. M. Tovar and A. Southan, *Polym. Chem.*, 2019, **10**, 4485 - 4494.