Correlating On-Substrate Prepared Electrochromes With Their Soluble Processed Counterparts – Towards Validating Polyazomethines as Electrochromes in Functioning Devices

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Electronic Supplementary Information (ESI)

Electronic Supplementary Information (ESI) Available: Complete material characterization data.
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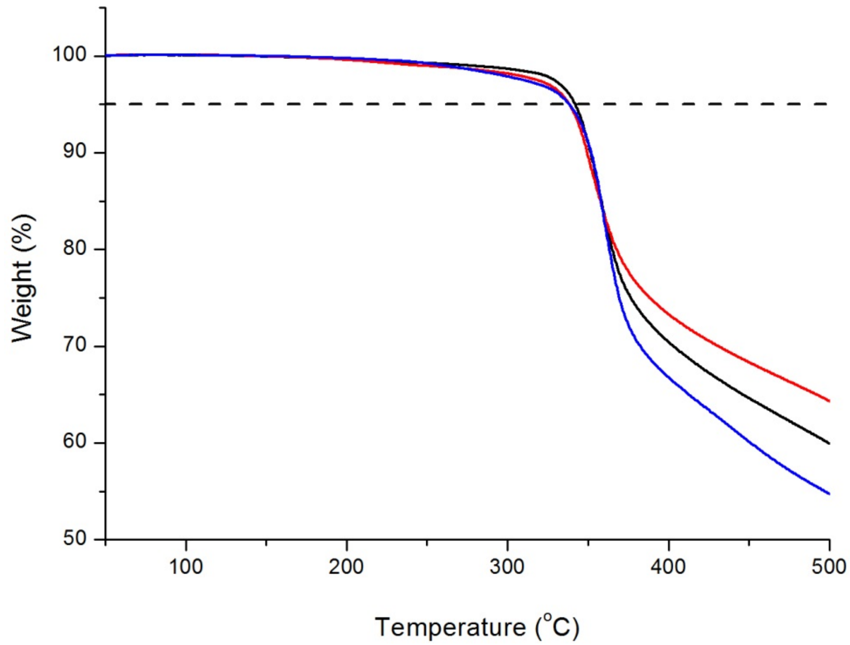
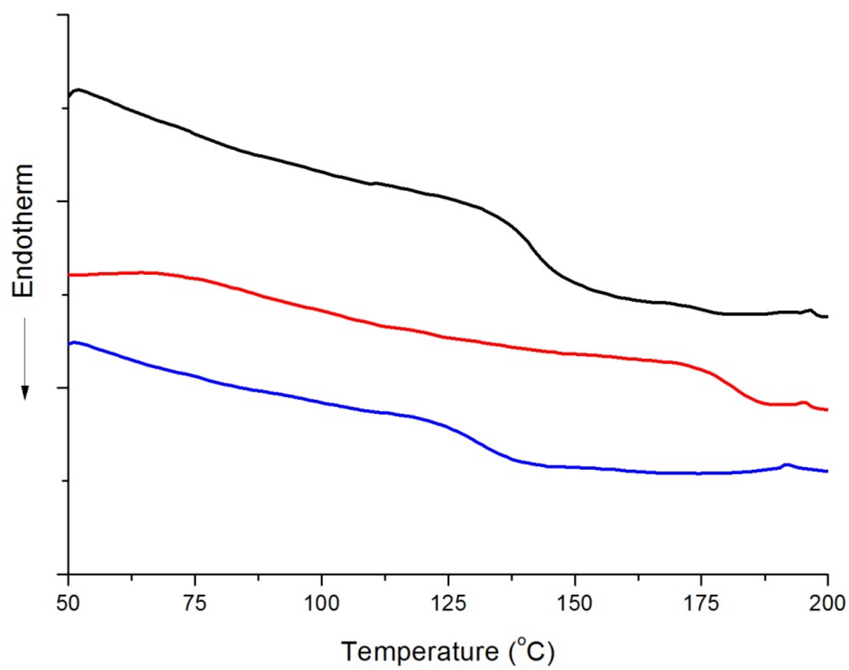


Figure S1. Thermal gravimetric isotherms of **P1** (▬), **P2** (▬), and **P3** (▬) with 5 wt% loss (---) shown.



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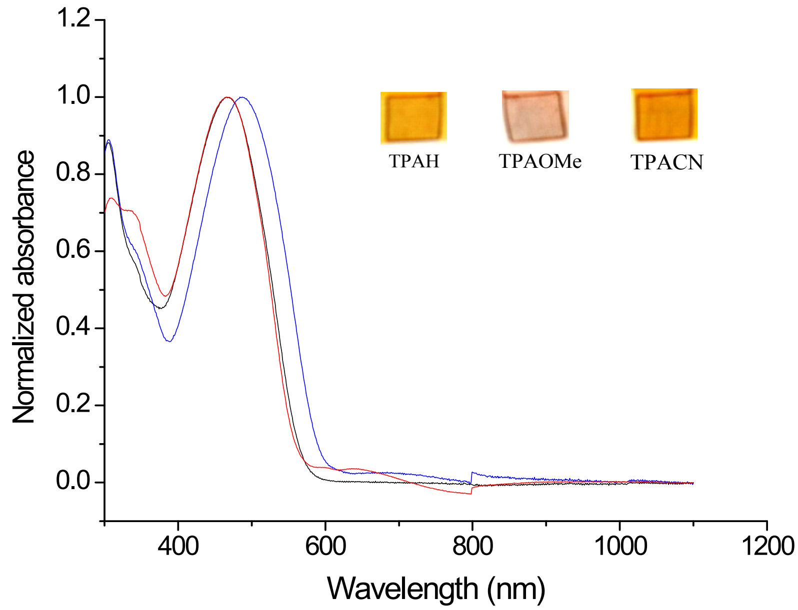

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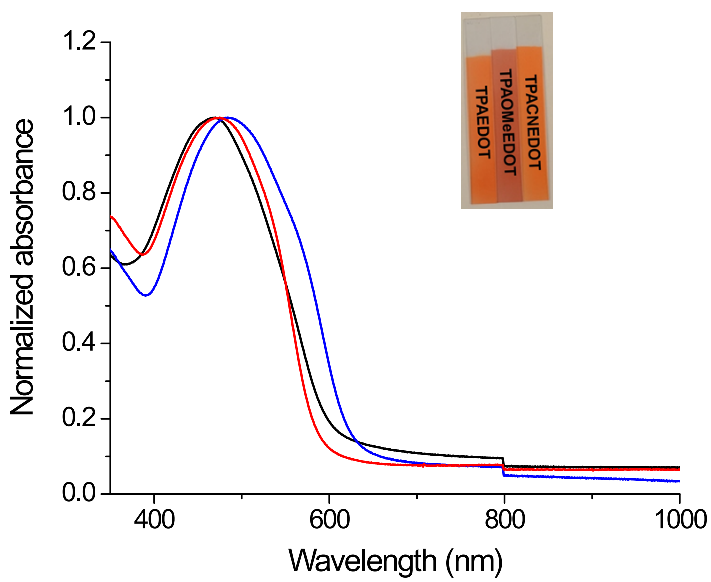
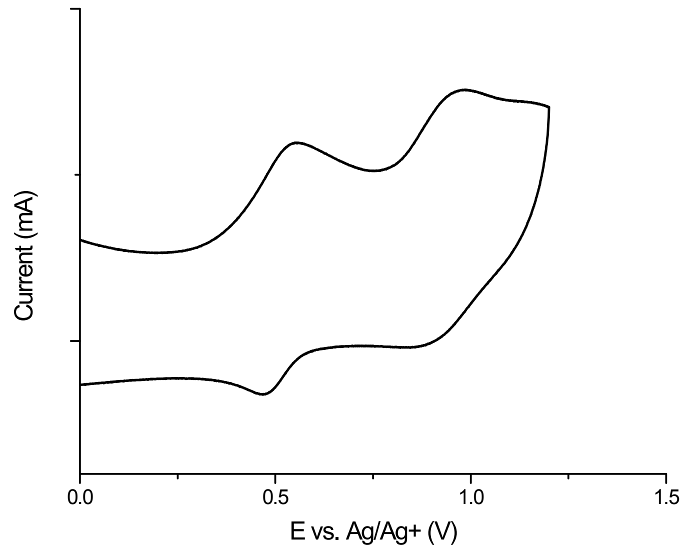


Figure S4**.** Normalized absorbance spectra of spray coated films **P1** (▬), **P2** (▬), and **P3** (▬) immobilized as 200 nm thin films on glass substrates.



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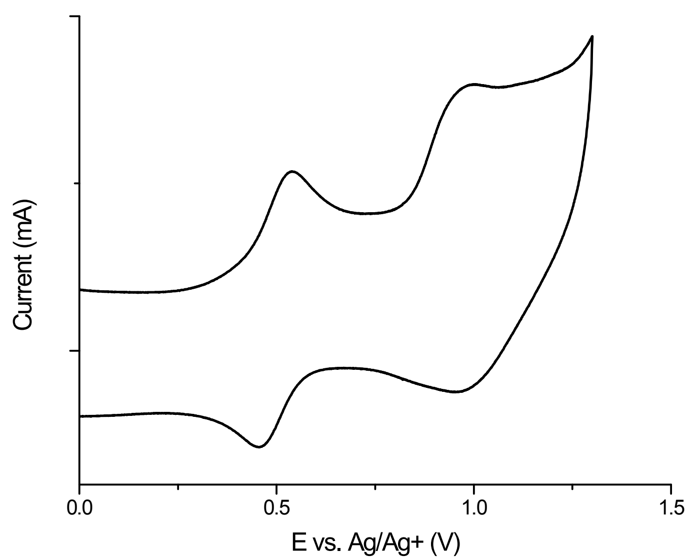

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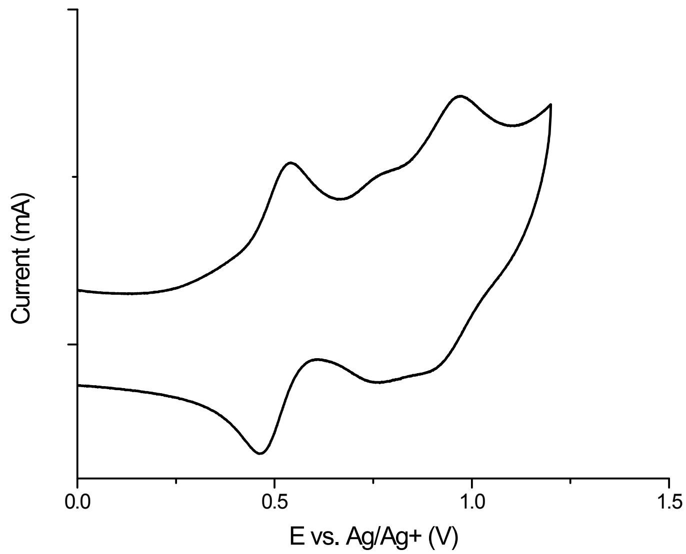

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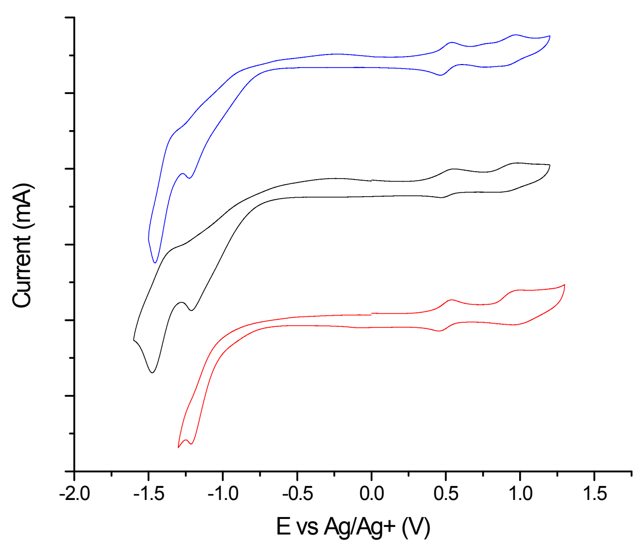

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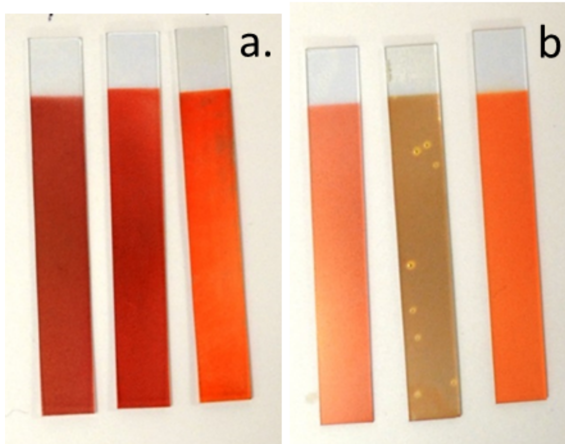

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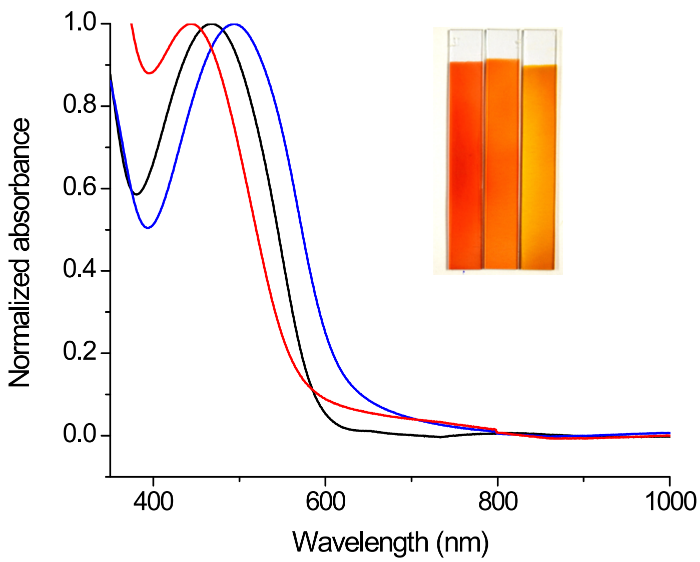

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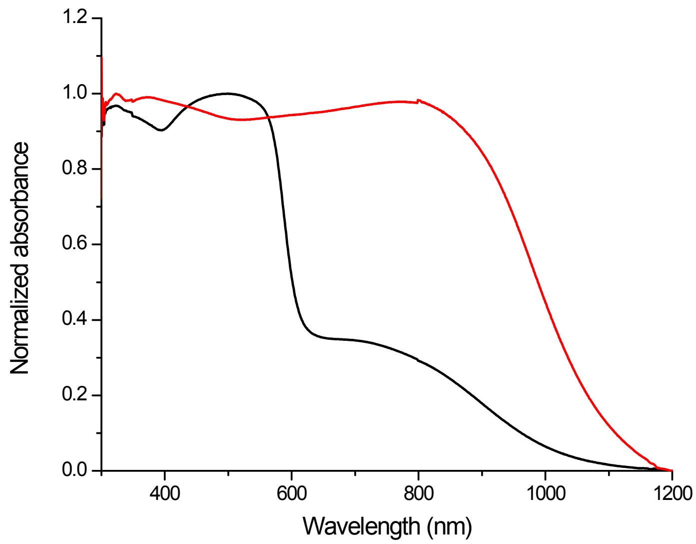

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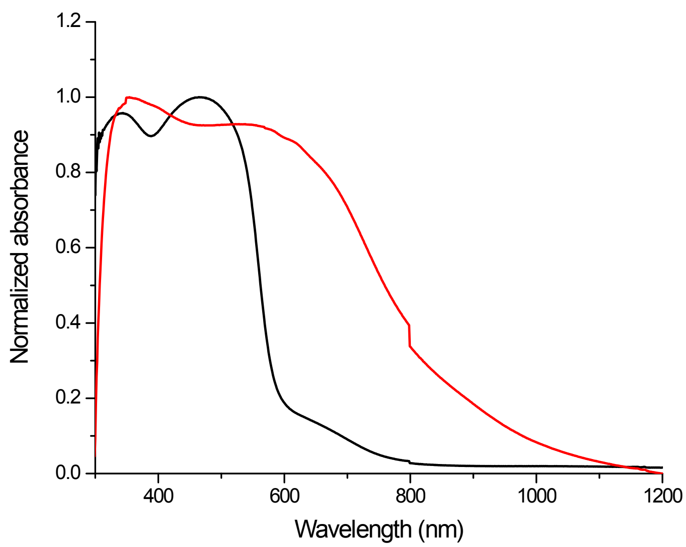

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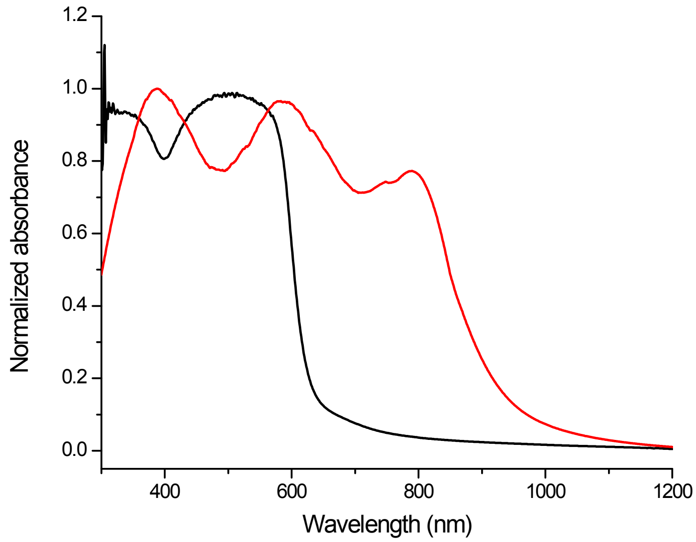

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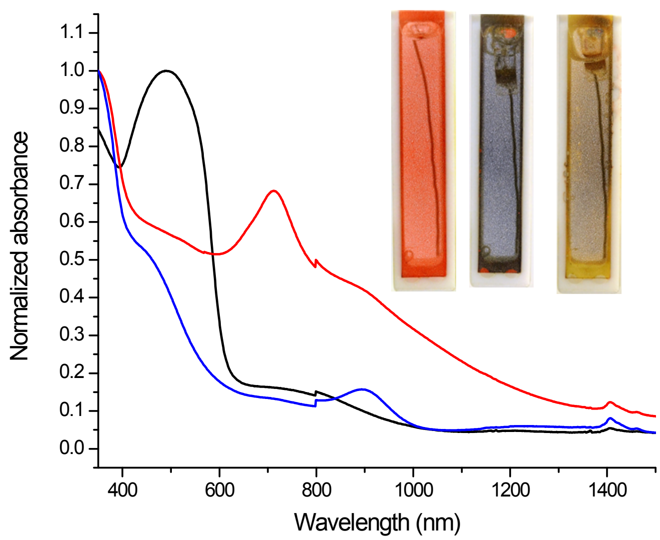

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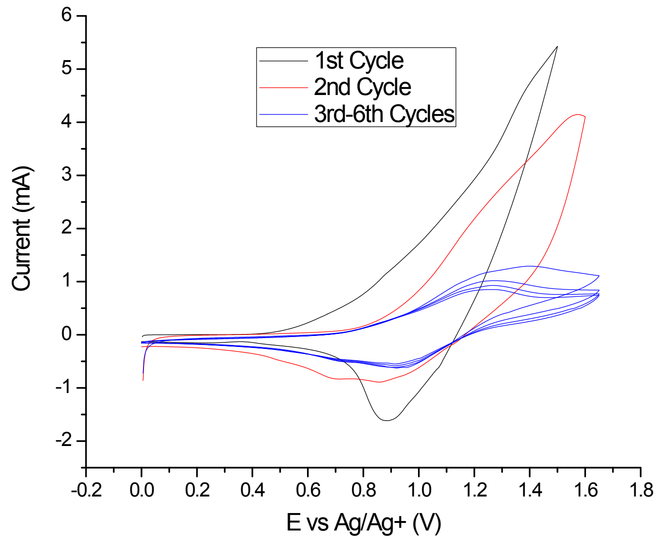

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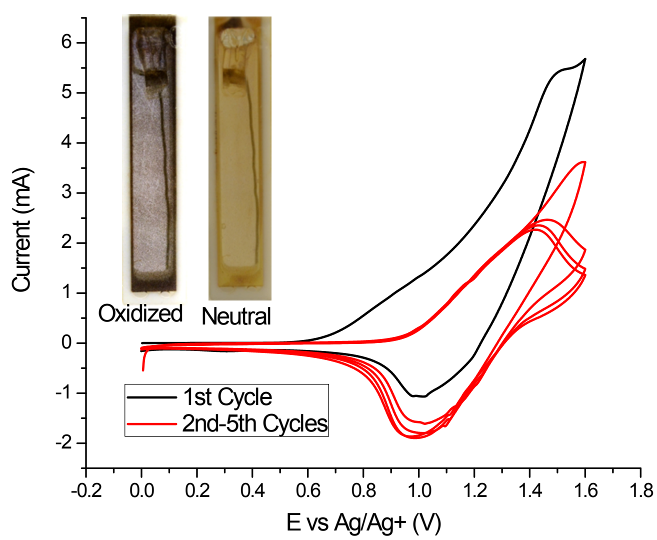

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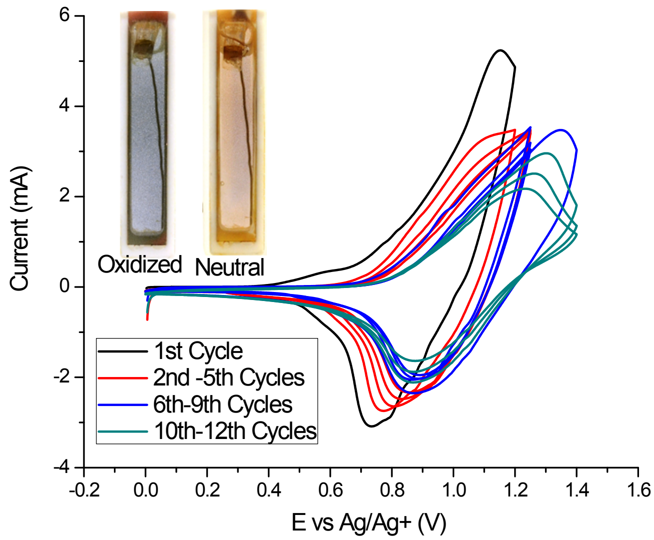

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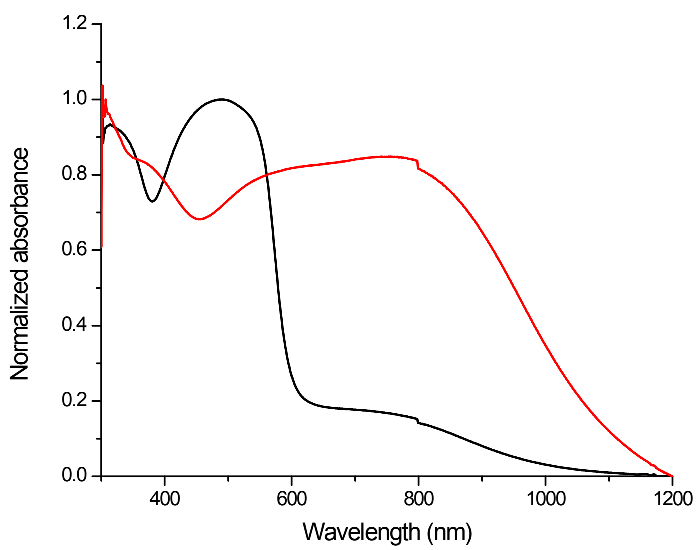

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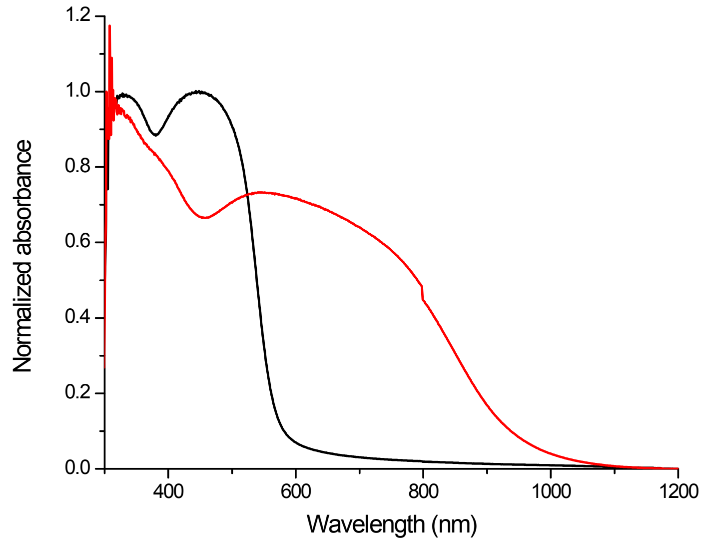

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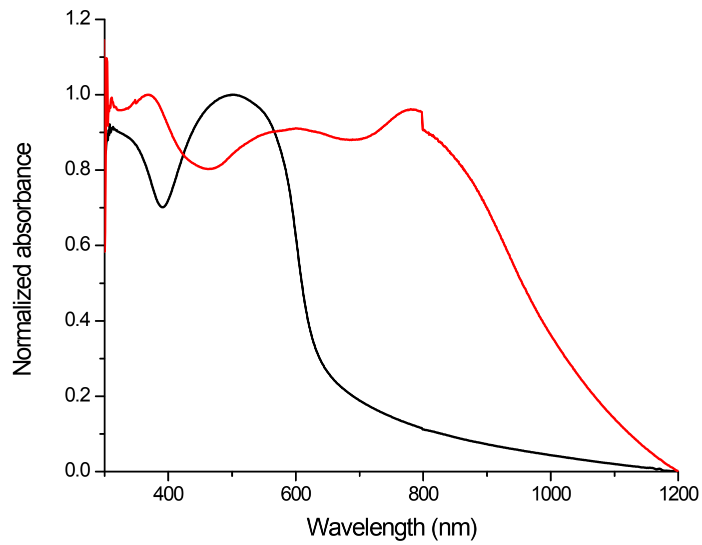

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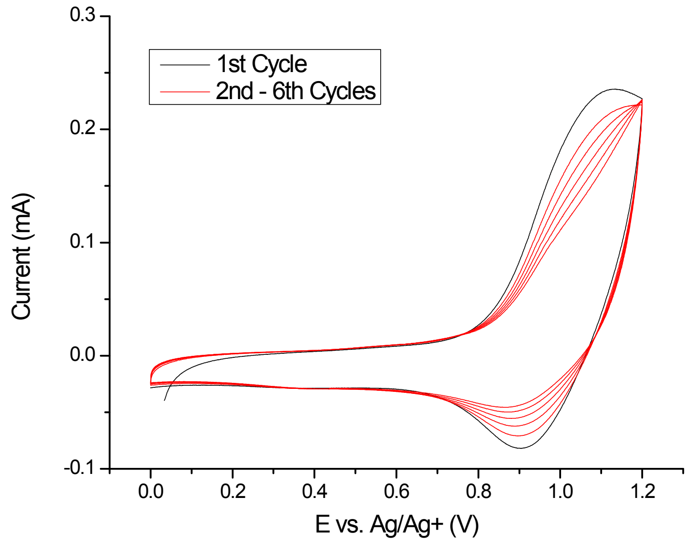


Figure S21. Electrochemistry of $\mathbf{P_{os}4}$ on ITO substrate acetonitrile with 0.1 M $TBAPF_6$ supporting electrolyte with Ag/Ag^+ non-aqueous reference and Pt wire counter electrodes. Scan rate: 100 mV/s.

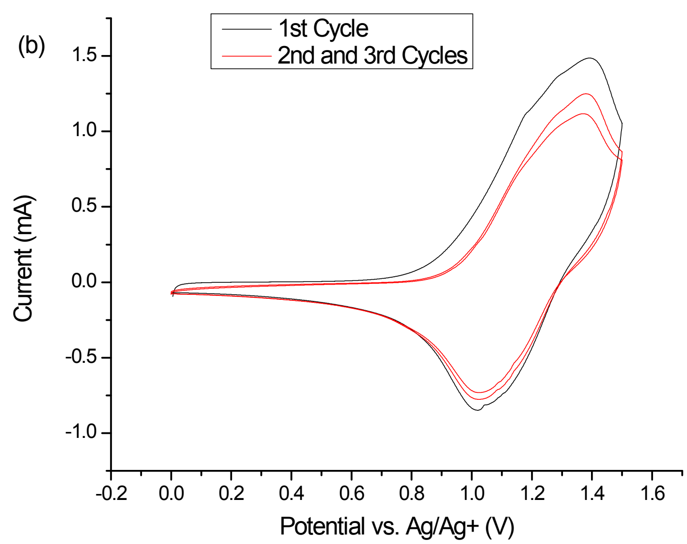
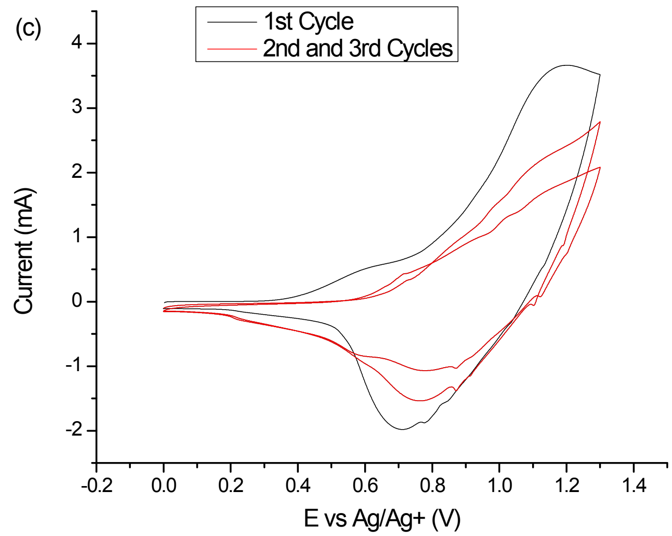


Figure S22. Electrochemistry of $\mathbf{P_{os}5}$ on ITO substrate in acetonitrile with 0.1 M $TBAPF_6$ supporting electrolyte with Ag/Ag^+ non-aqueous reference and Pt wire counter electrodes. Scan rate: 100 mV/s.



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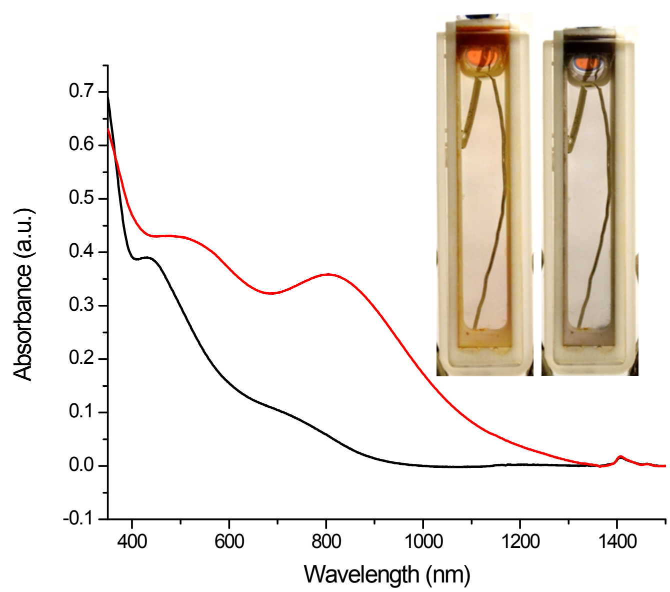


Figure S24. Spectroelectrochemistry of $\mathbf{P_{os}4}$ on ITO substrate in the neutral (▬) and oxidized (▬) states. Inset: photographs of the neutral (left) and oxidized (right) states of TPA-Th films.

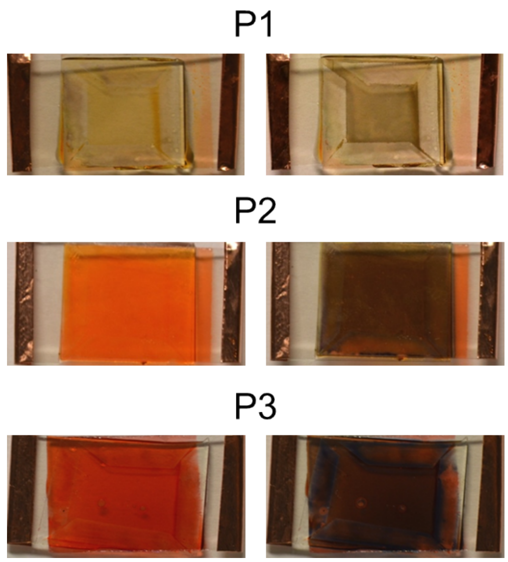


Figure S25. Neutral (left) and oxidized (right) states of electrochromic devices with the solution prepared azomethines as the electroactive layer.

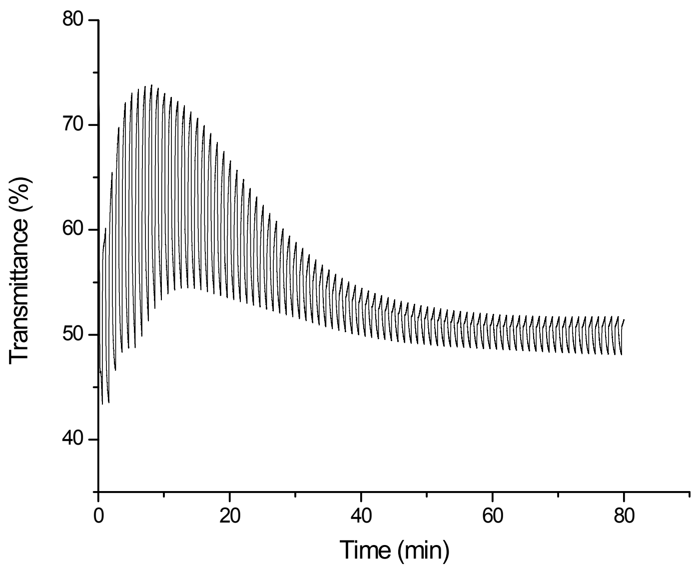
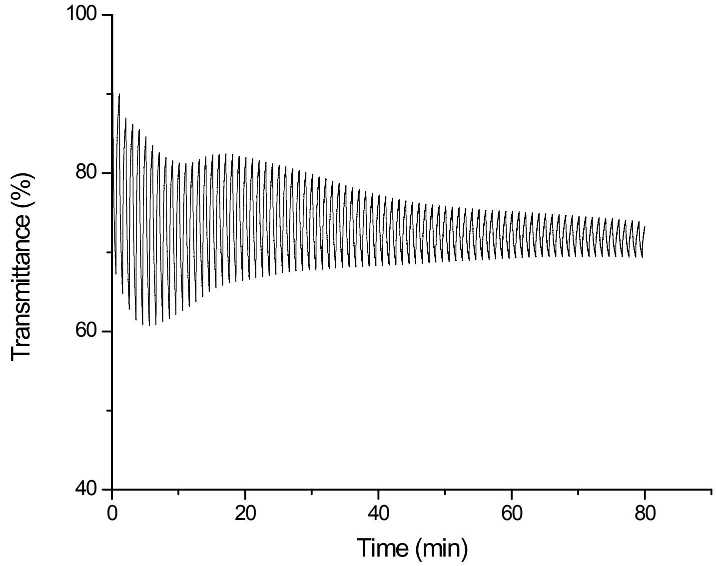


Figure S26. Transmission % of **P1** on ITO substrate as a function of time monitored at 710 nm as a function of applied potential between 3.0 and -0.9 V at 30 sec intervals.



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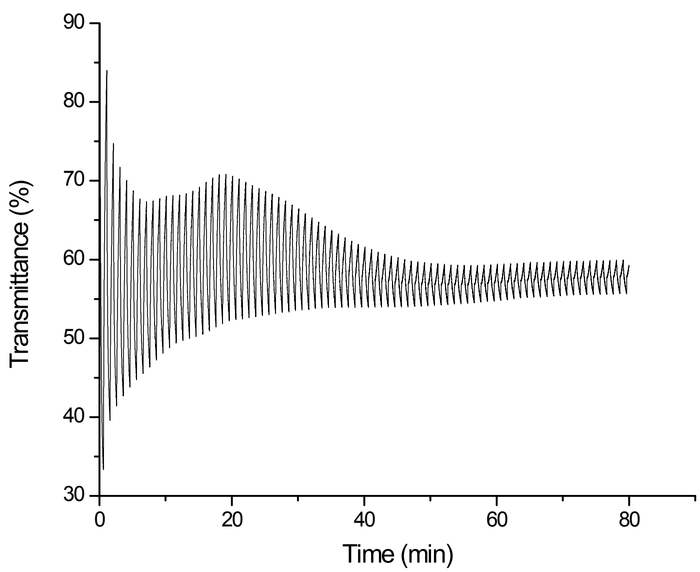


Figure S28. Transmission % of **P3** on ITO substrate as a function of time monitored at 710 nm as a function of applied potential between 3.0 and -0.9 V at 30 sec intervals.

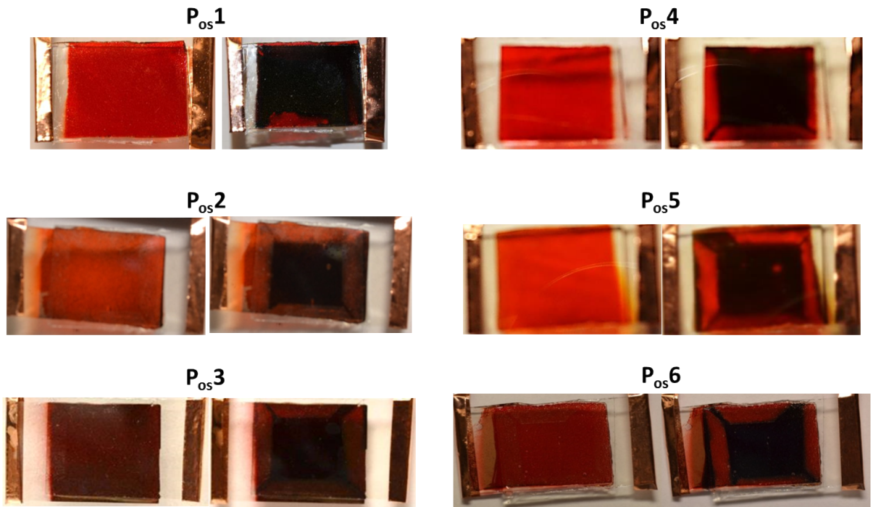


Figure S29. Neutral (left) and oxidized (right) states of electrochromic devices prepared with on-substrate prepared polyazomethines as the electroactive layer.

Table S1. 2° CIE *Lab* coordinates of polyazomethines in solution.

Polymer	State	L*	a*	b*
P1	Neutral	96	9	26
P1	Oxidized	86	-3	-0.5
P2	Neutral	83	15	50
P2	Oxidized	69	-13	-9
P3	Neutral	98	13	14
P3	Oxidized	88	-6	0.8

Table S2. 2° CIE *Lab* coordinates of solution-made polyazomethines immobilized on ITO coated glass substrates.

Polymer	State	L*	a*	b*
P1	Neutral	84	22	34
P1	Oxidized	69	0.9	13
P2	Neutral	84	22	16
P2	Oxidized	66	-0.6	9
P3	Neutral	89	20	29
P3	Oxidized	79	-2	5

Table S3. 2° CIE *Lab* coordinates of on-substrate prepared polyazomethines immobilized on ITO coated glass substrates.

Polymer	State	L*	a*	b*
$\mathbf{P_{os}1}$	Neutral	51	38	25
$\mathbf{P_{os}1}$	Oxidized	33	-0.6	0.7
$\mathbf{P_{os}2}$	Neutral	61	51	78
$\mathbf{P_{os}2}$	Oxidized	27	3.0	1.6
$\mathbf{P_{os}3}$	Neutral	54	20	8.0
$\mathbf{P_{os}3}$	Oxidized	21	3.0	0.4
$\mathbf{P_{os}4}$	Neutral	61	47	44
$\mathbf{P_{os}4}$	Oxidized	36	-1.5	-5.7
$\mathbf{P_{os}5}$	Neutral	64	46	104
$\mathbf{P_{os}5}$	Oxidized	4	1.0	-1.8
$\mathbf{P_{os}6}$	Neutral	36	39	22
$\mathbf{P_{os}6}$	Oxidized	19	-0.5	-3.6

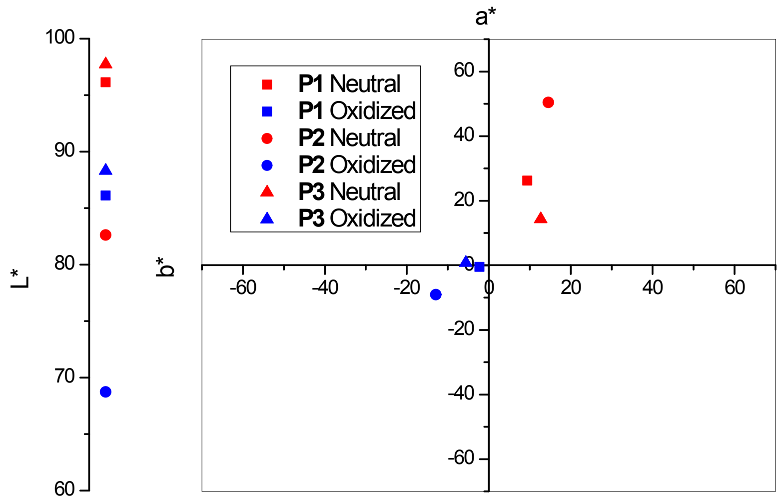


Figure S30. 2° CIE *Lab* coordinates of **P1-P3** of thin films on ITO coated glass.

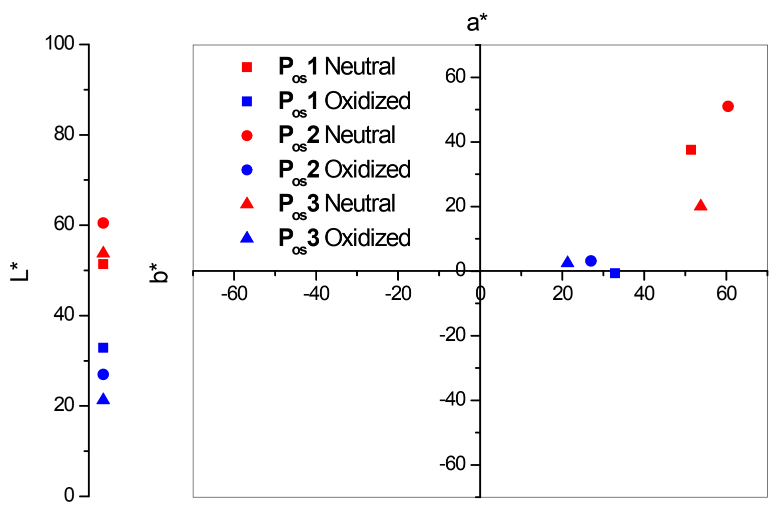


Figure S31. 2° CIE *Lab* coordinates for $\mathbf{P_{os}1}$-$\mathbf{P_{os}3}$ of thin films on ITO coated glass.

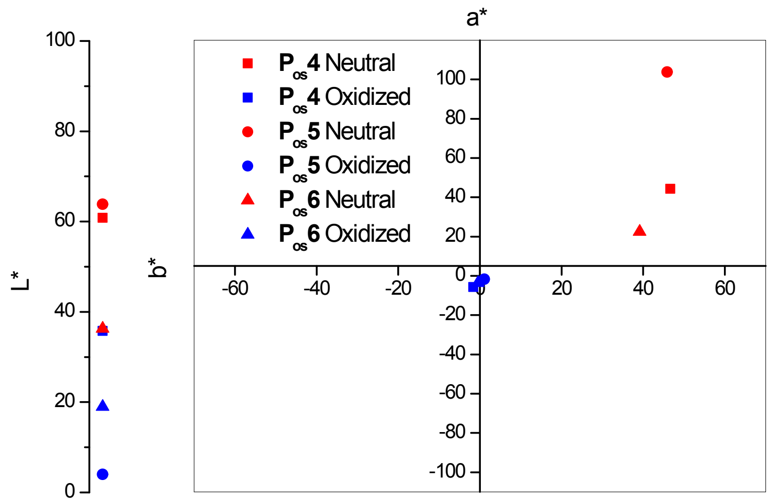


Figure S32. 2° CIE *Lab* coordinates for **P$_{os}$4-P$_{os}$6** of thin films on ITO coated glass.

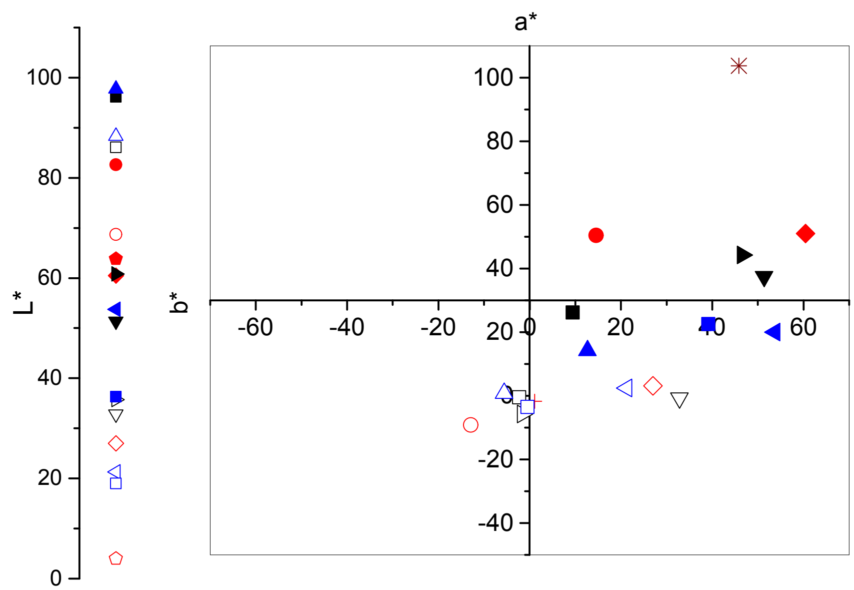


Figure S33. 2° CIE *Lab* coordinates of **P1** (■), **P2** (●), **P3** (▲), **P$_{os}$1** (▼), **P$_{os}$2** (♦), **P$_{os}$3** (◀), **P$_{os}$4** (▶), **P$_{os}$5** (*) and **P$_{os}$6** (■) combined.

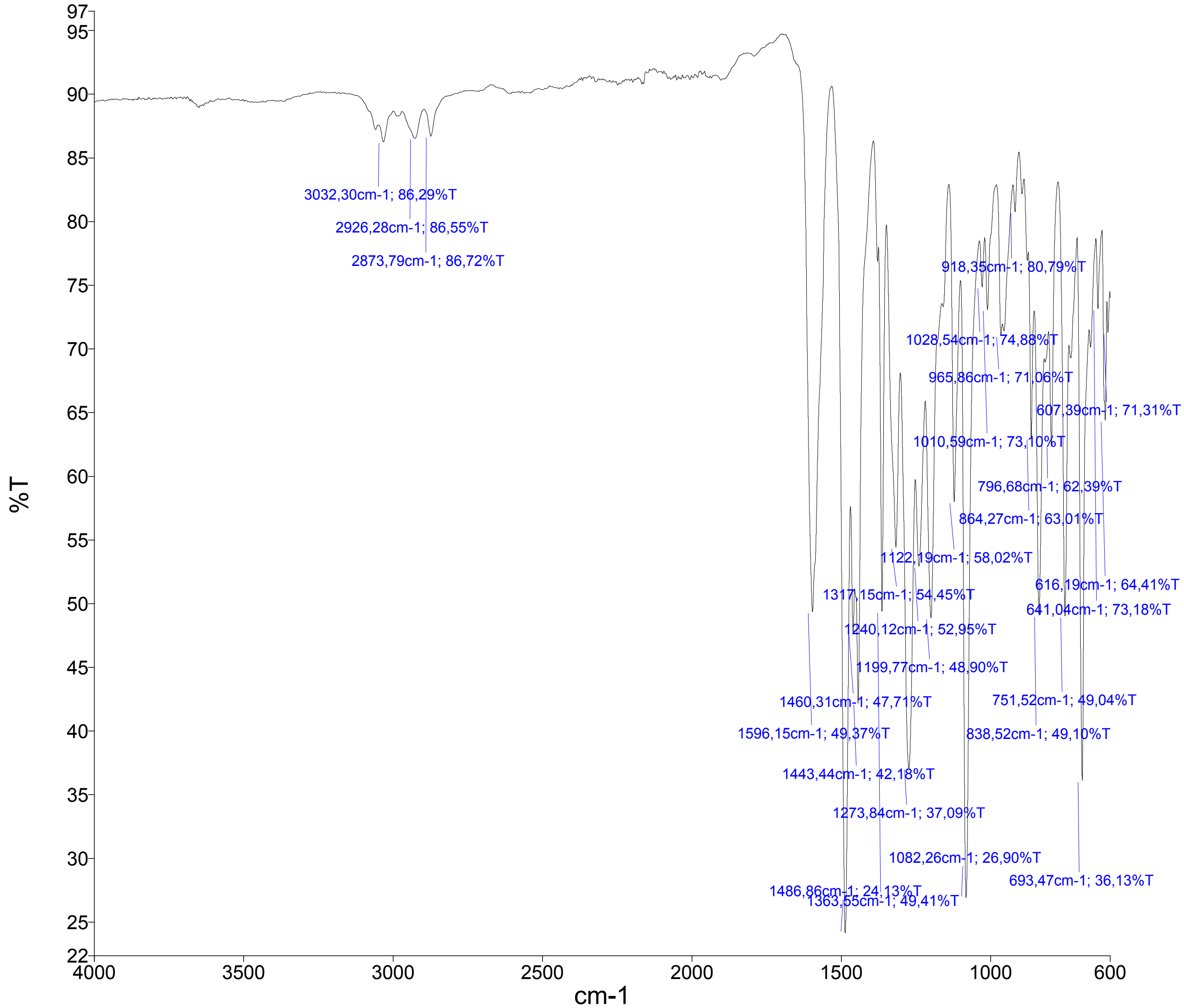
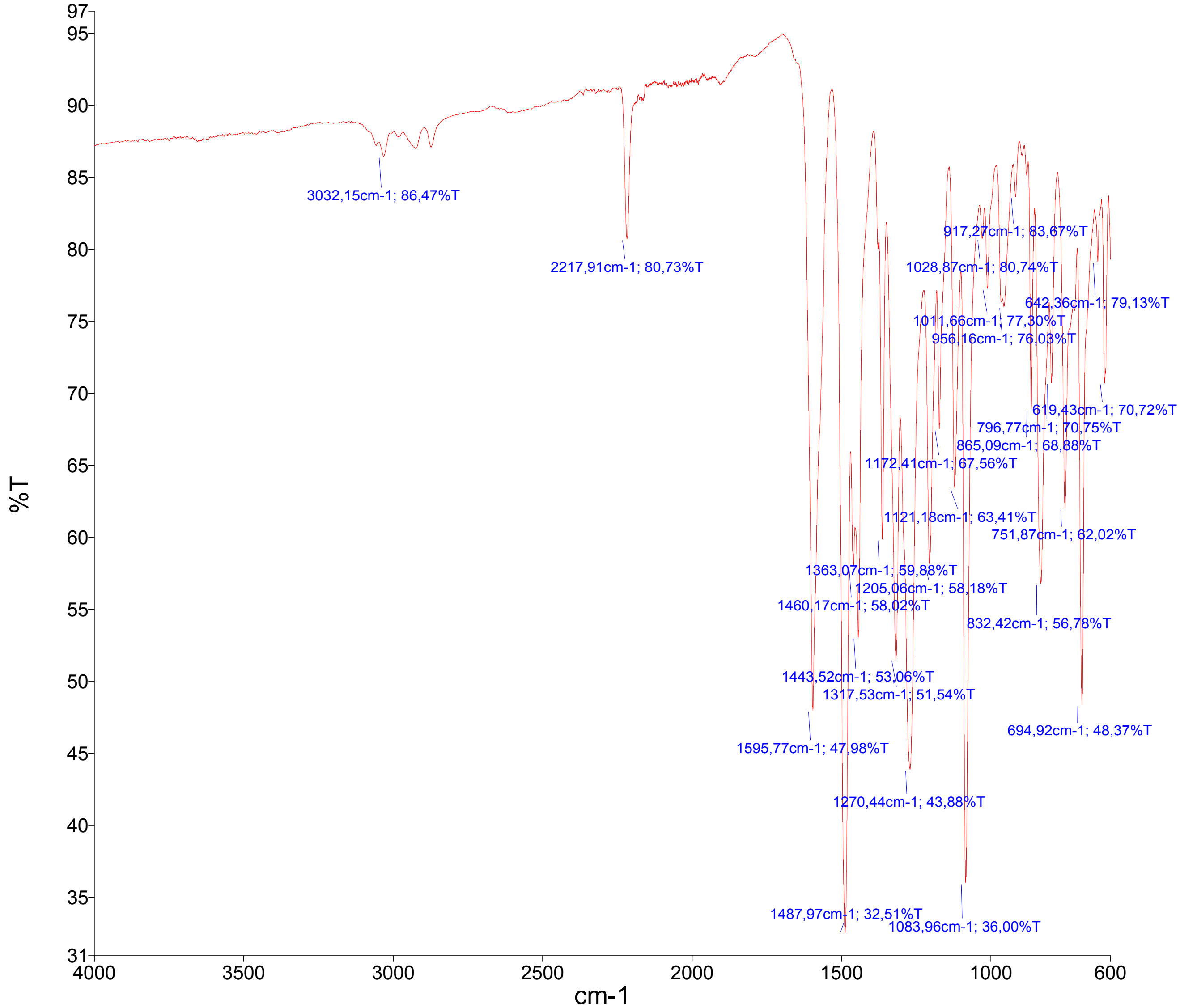


Figure S34. IR spectrum of **P1**.



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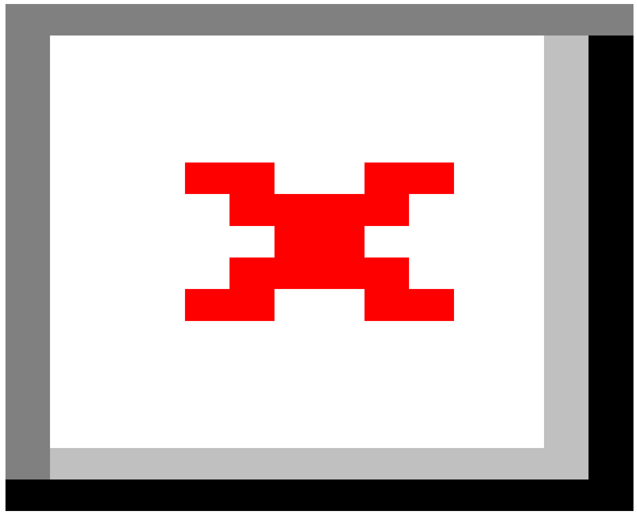
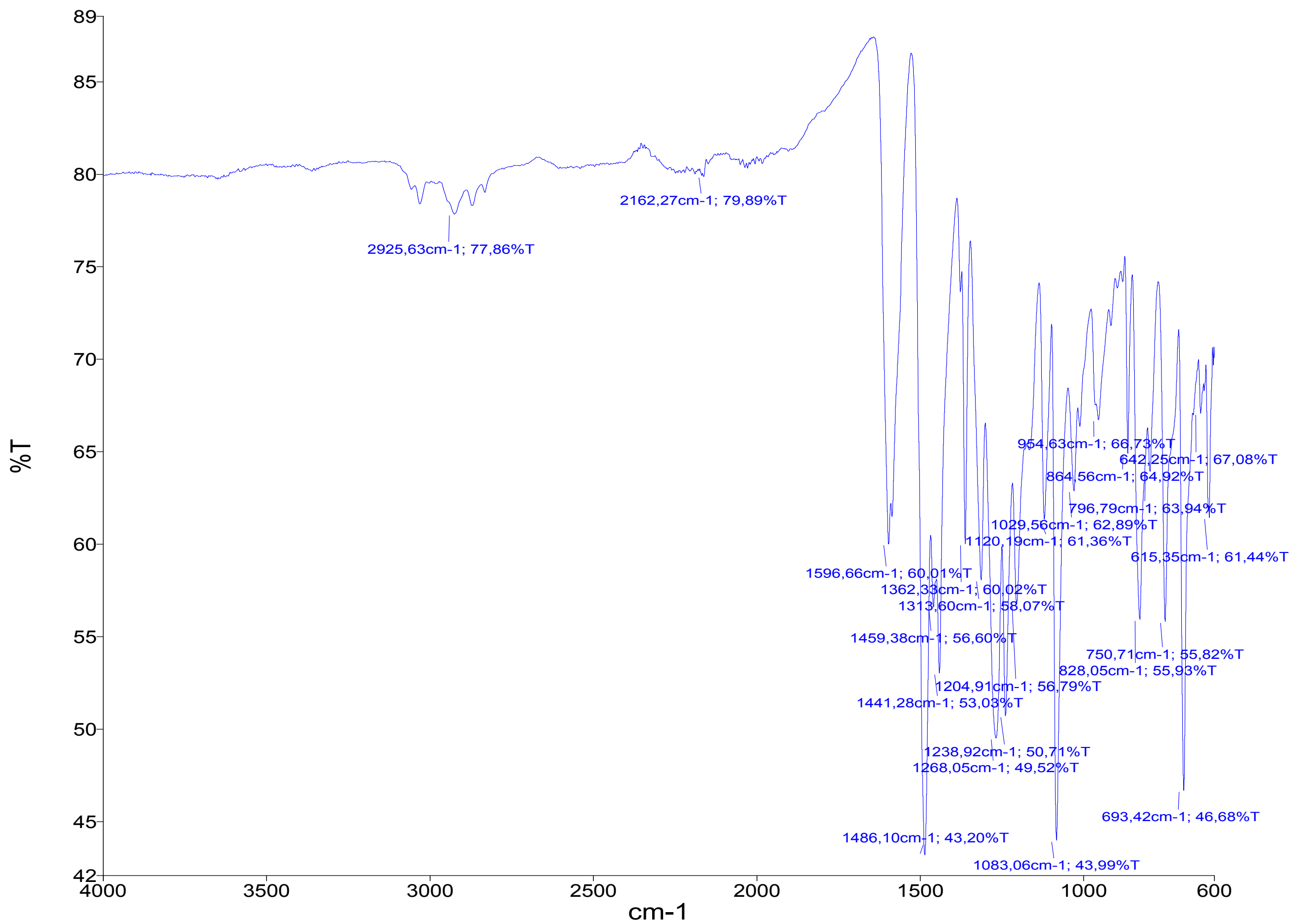


Figure S36. ^{1}H-NMR spectrum of **P2** in $CDCl_3$.



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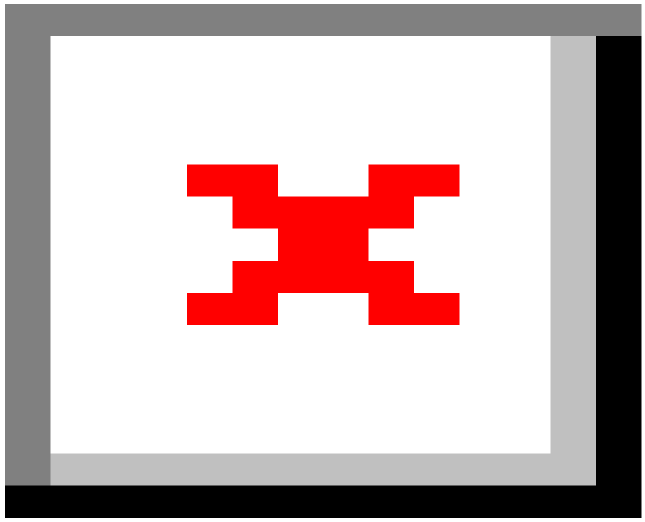

Figure S38. ^{1}H-NMR spectrum of **P3** in $CDCl_3$.

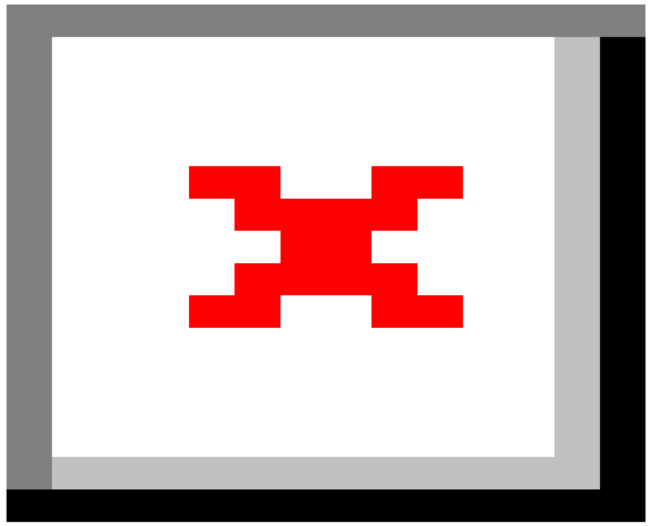

Figure S39. ^{1}H-NMR spectrum of **P1** in $CDCl_3$.

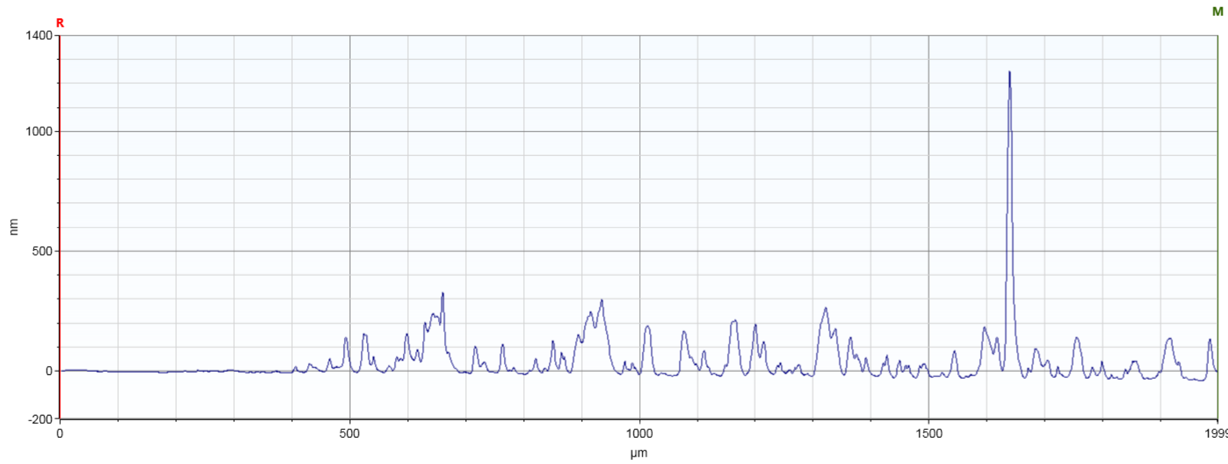

Figure S40. First profilometry scan of **P1** film on ITO coated glass.

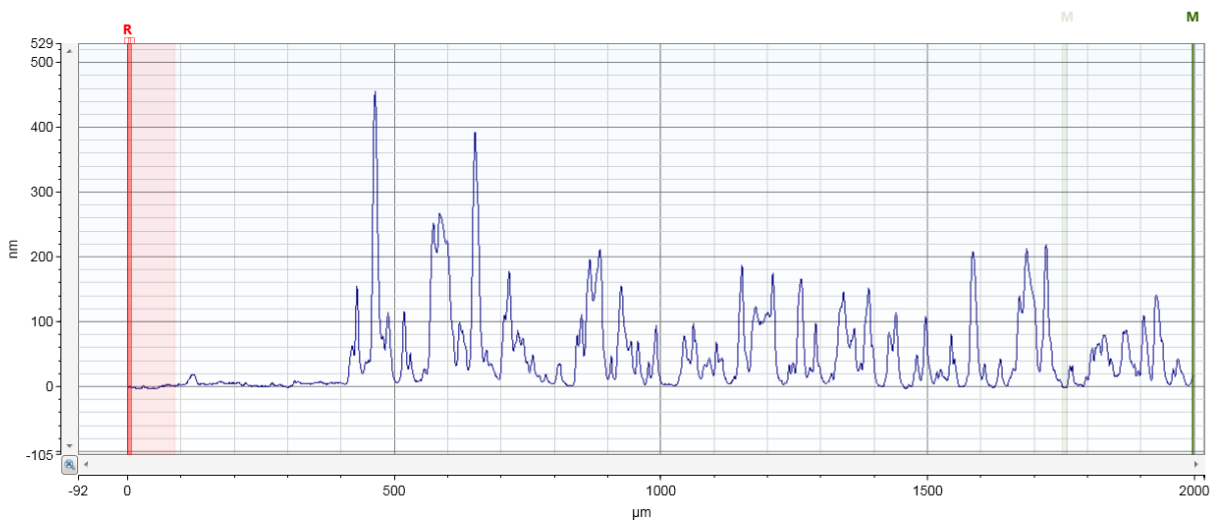

Figure S41. Second profilometry scan of **P1** film on ITO coated glass.

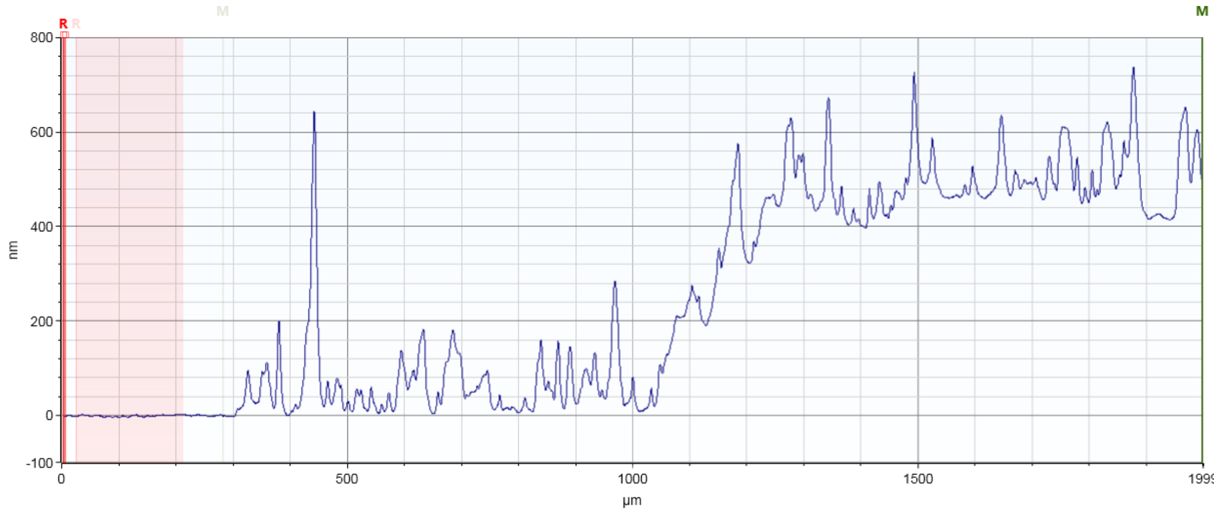

Figure S42. Third profilometry scan of **P1** film on ITO coated glass.

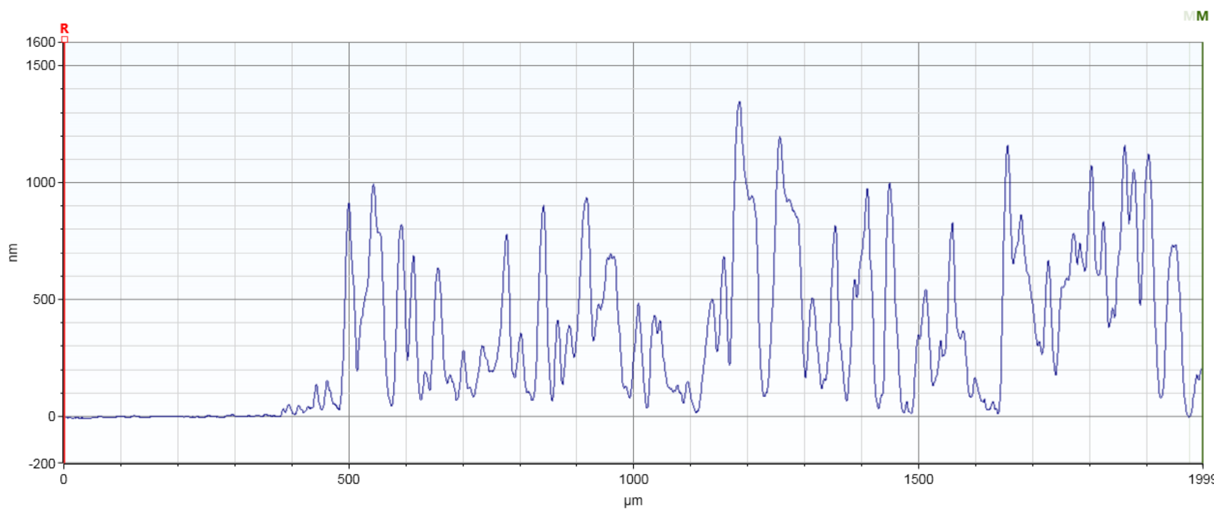

Figure S43. First profilometry scan of **P2** on ITO coated glass.

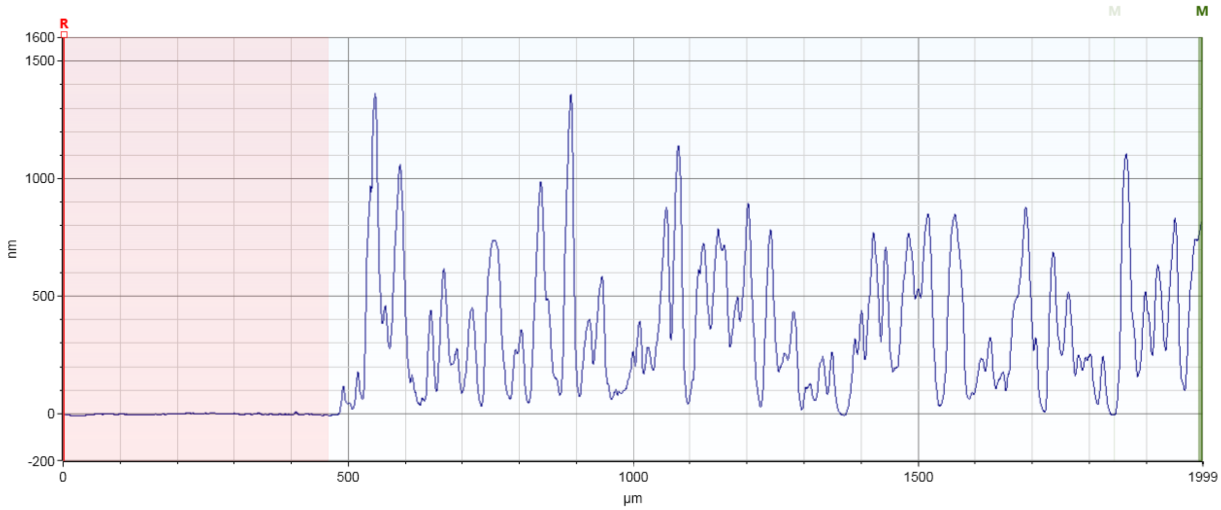

Figure S44. Second profilometry scan of **P2** on ITO coated glass.

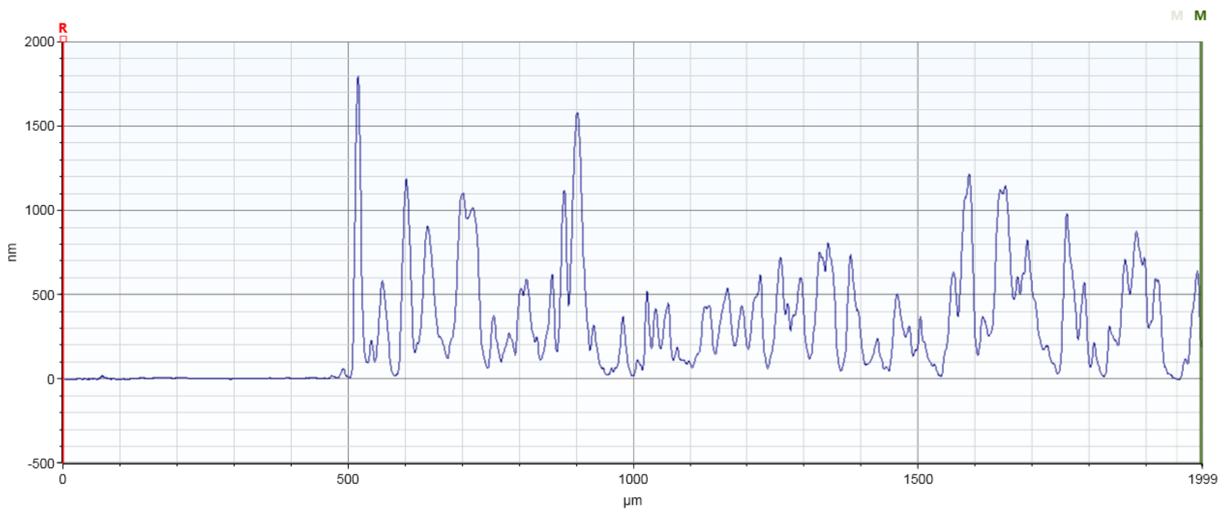

Figure S45. Third profilometry scan of **P2** on ITO coated glass.

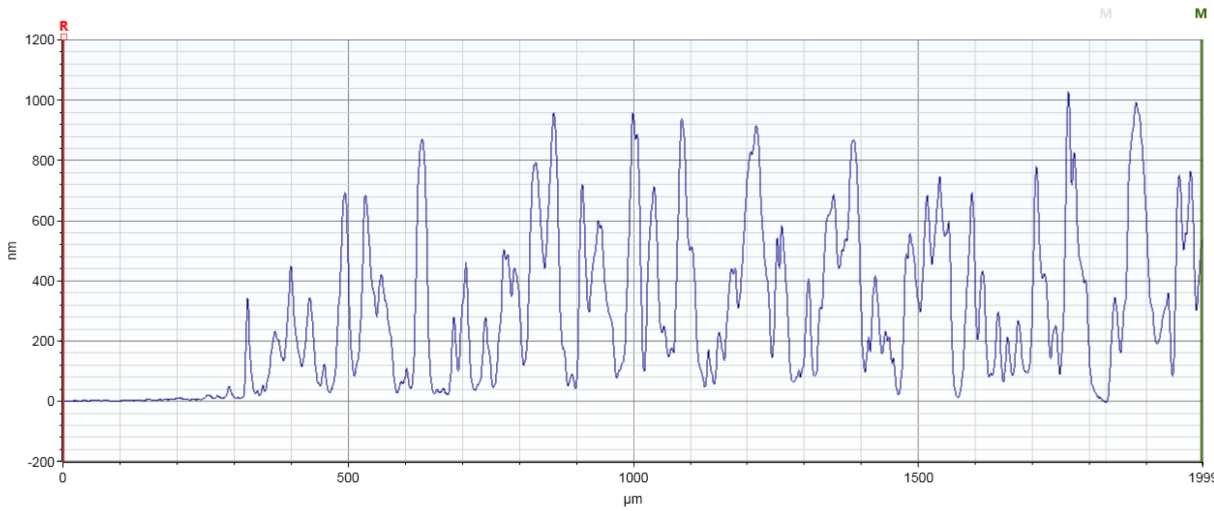

Figure S46. First profilometry scan of **P3** on ITO coated glass.

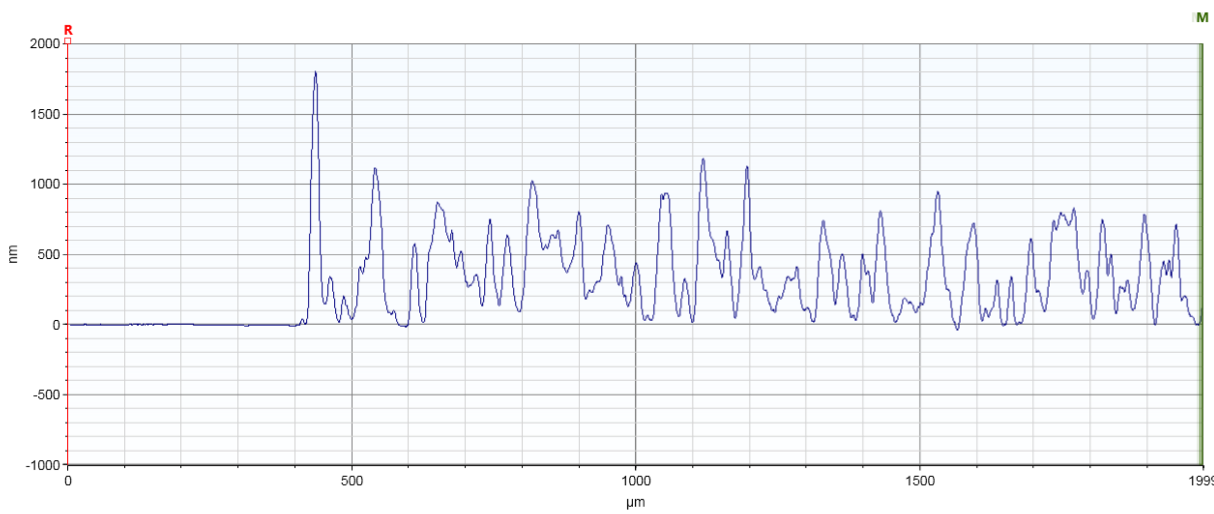

Figure S47. Second profilometry scan of **P3** on ITO coated glass.

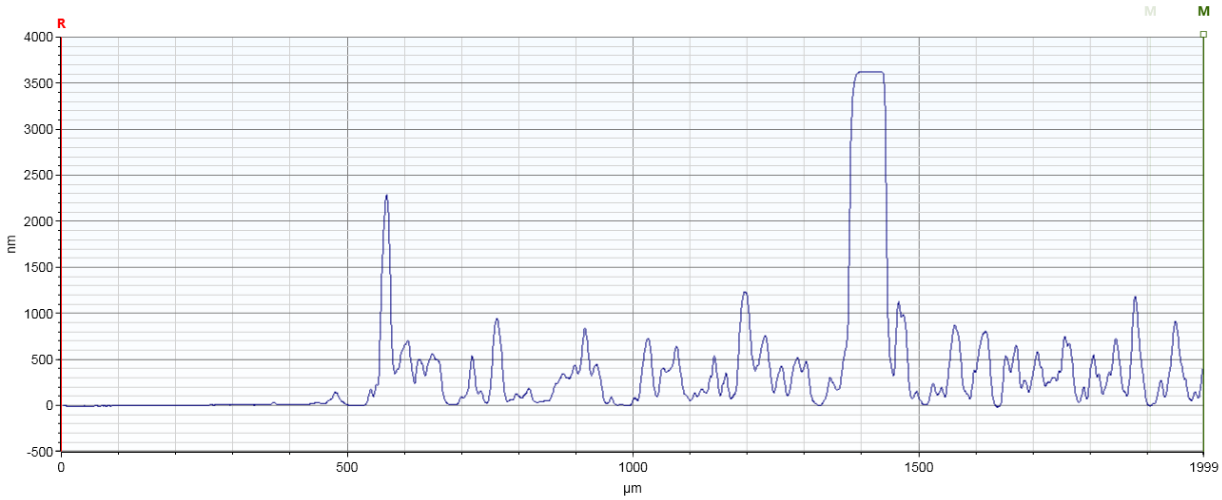

Figure S48. Third profilometry scan of **P3** on ITO coated glass.

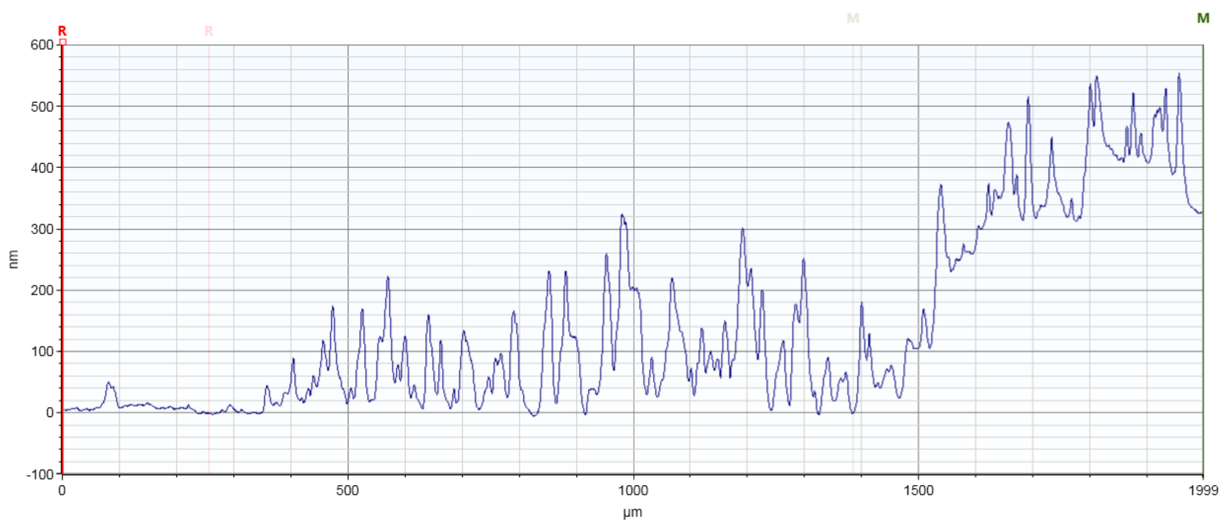

Figure S49. First profilometry scan of $\mathbf{P_{os}1}$ on ITO coated glass.

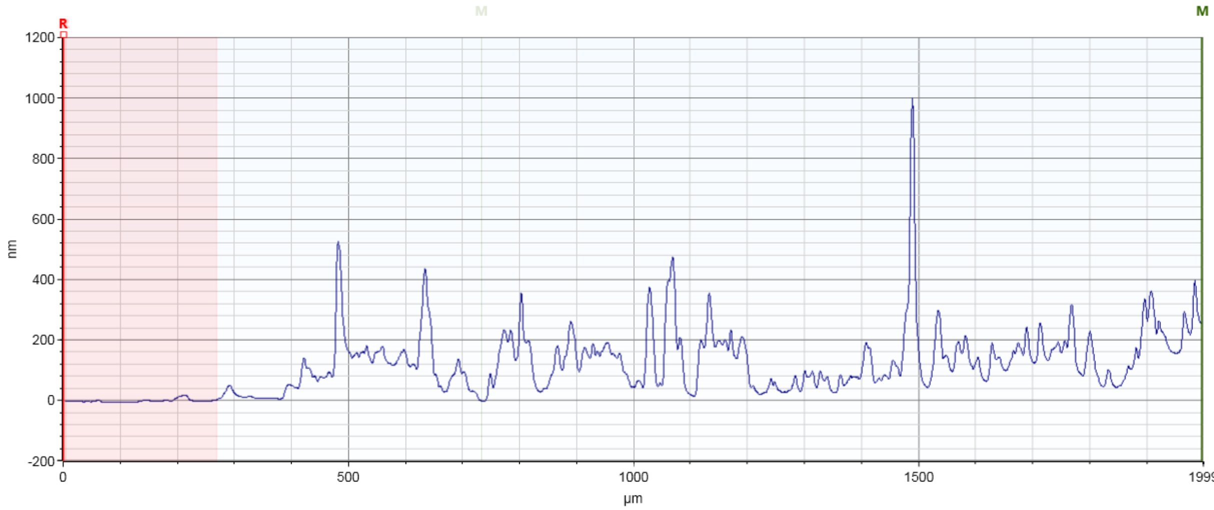

Figure S50. Second profilometry scan of $\mathbf{P_{os}1}$ on ITO coated glass.

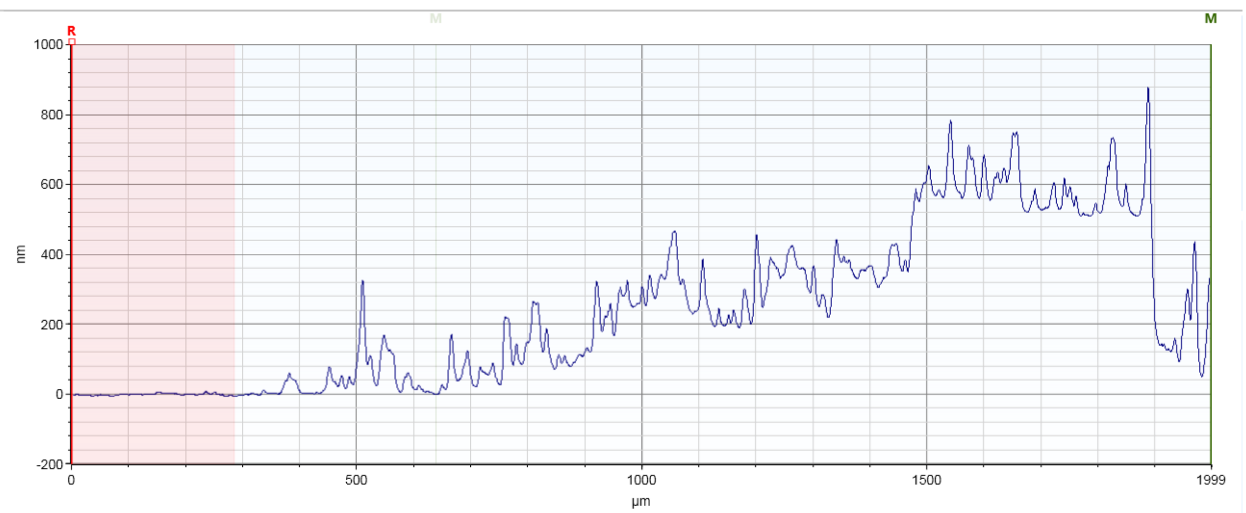

Figure S51. Third profilometry scan of $\mathbf{P_{os}1}$ on ITO coated glass.

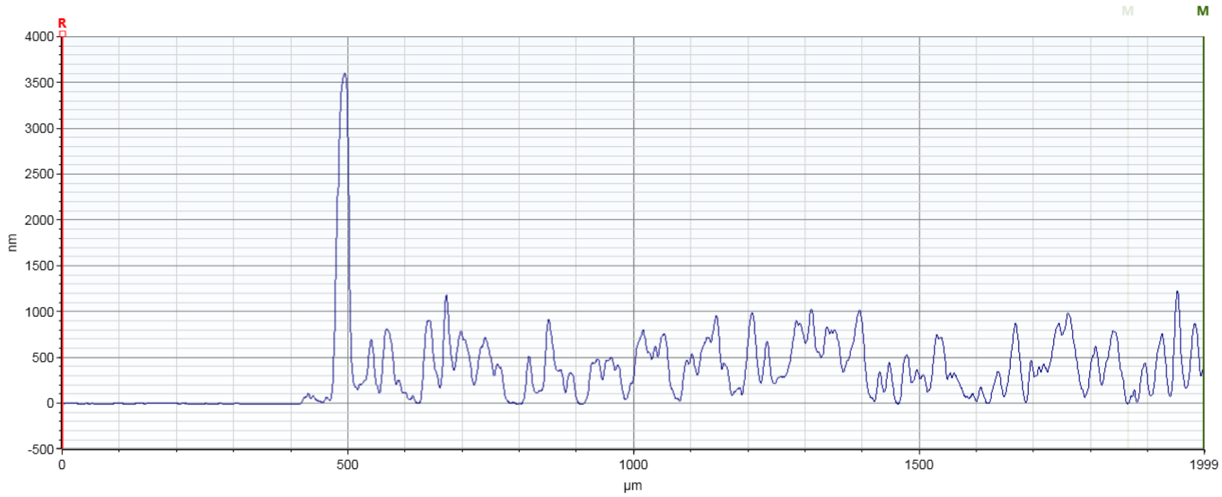

Figure S52. First profilometry scan of $\mathbf{P_{os}2}$ on ITO coated glass.

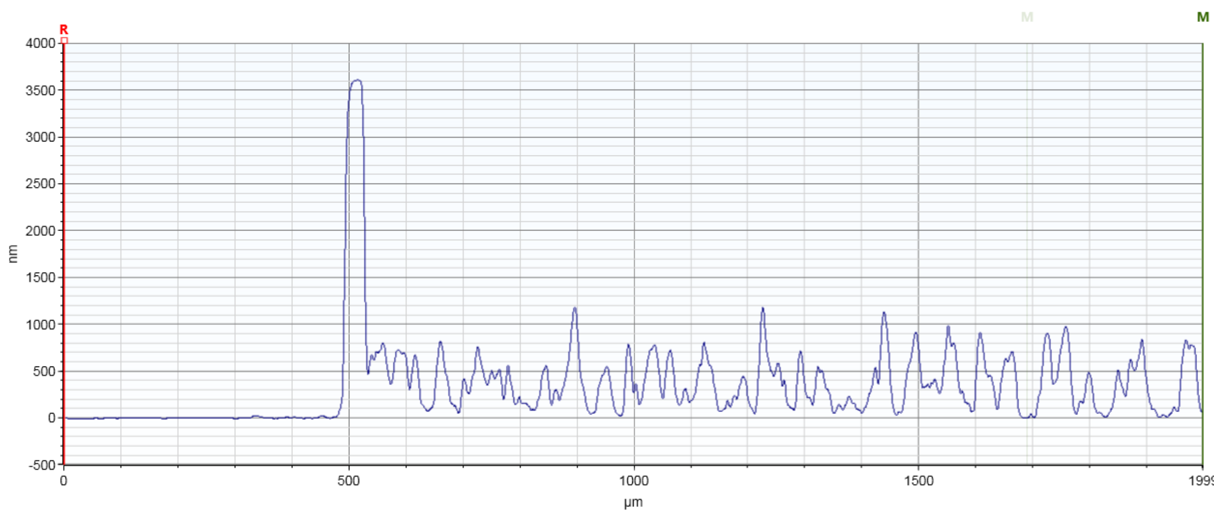

Figure S53. Second profilometry scan of $\mathbf{P_{os}2}$ on ITO coated glass.

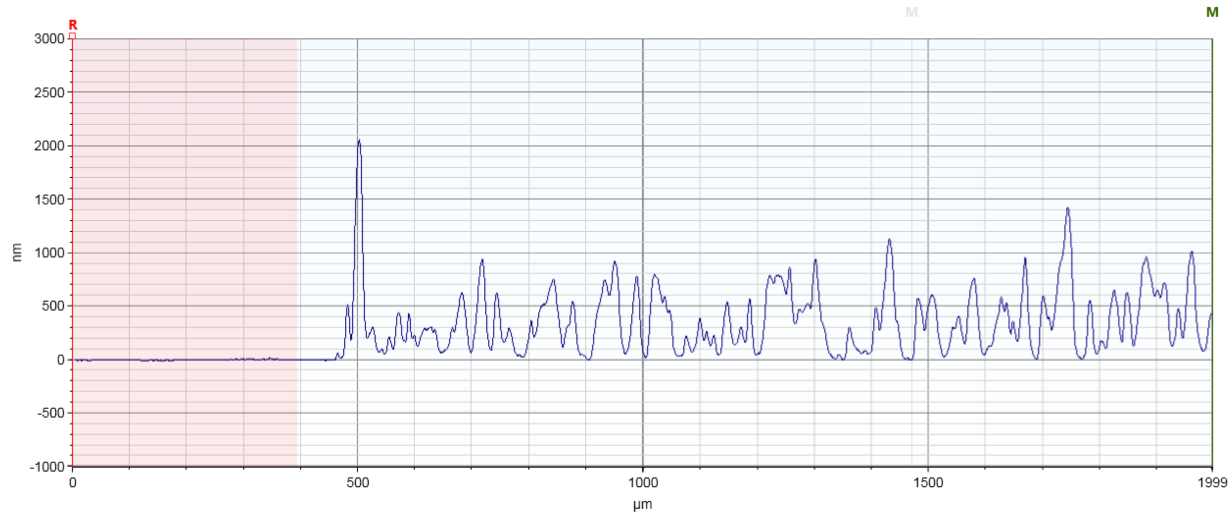

Figure S54. Third profilometry scan of $\mathbf{P_{os}2}$ on ITO coated glass.

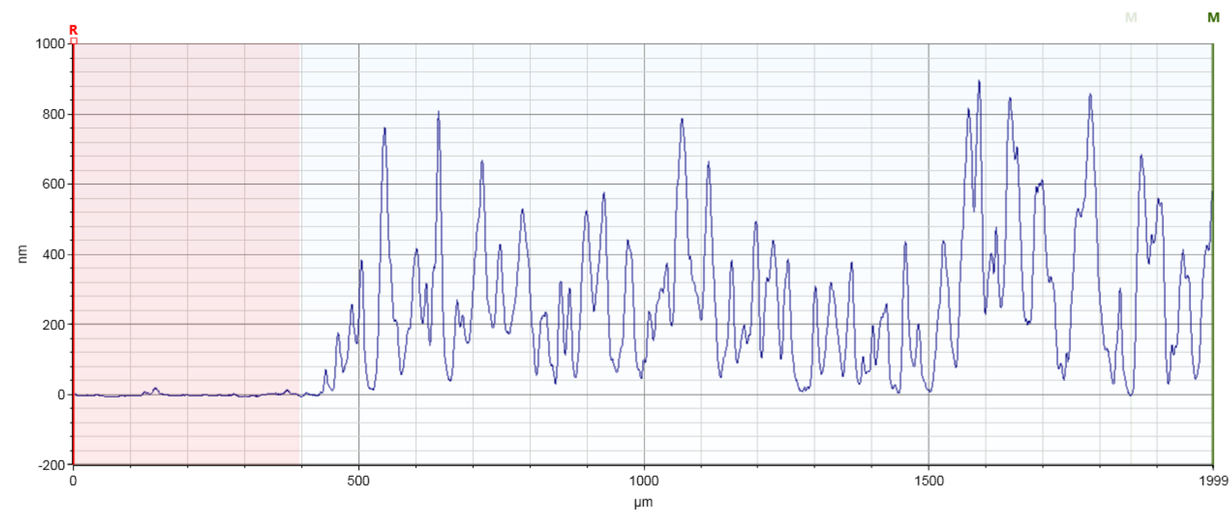

Figure S55. First profilometry scan of $P_{os}3$ on ITO.

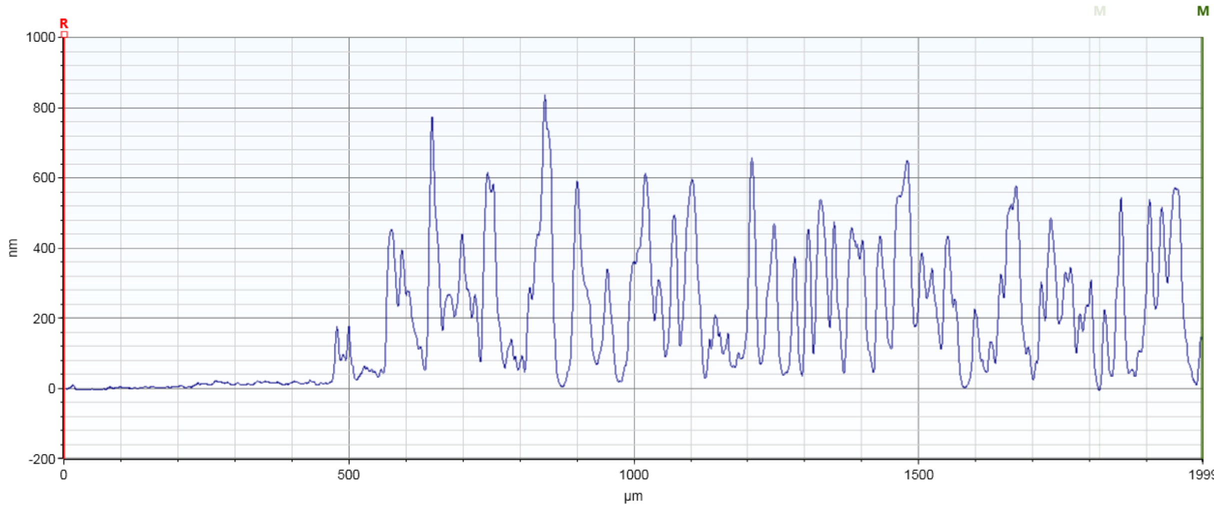

Figure S56. Second profilometry scan of **P$_{os}$3** on ITO coated glass.

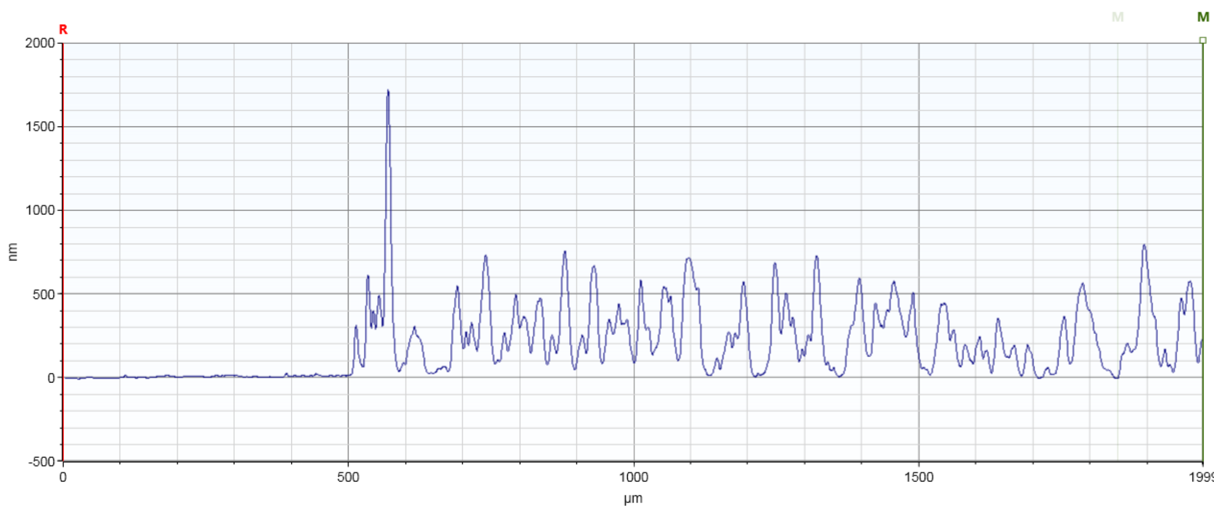

Figure S57. Third profilometry scan of **P$_{os}$3** on ITO coated glass.

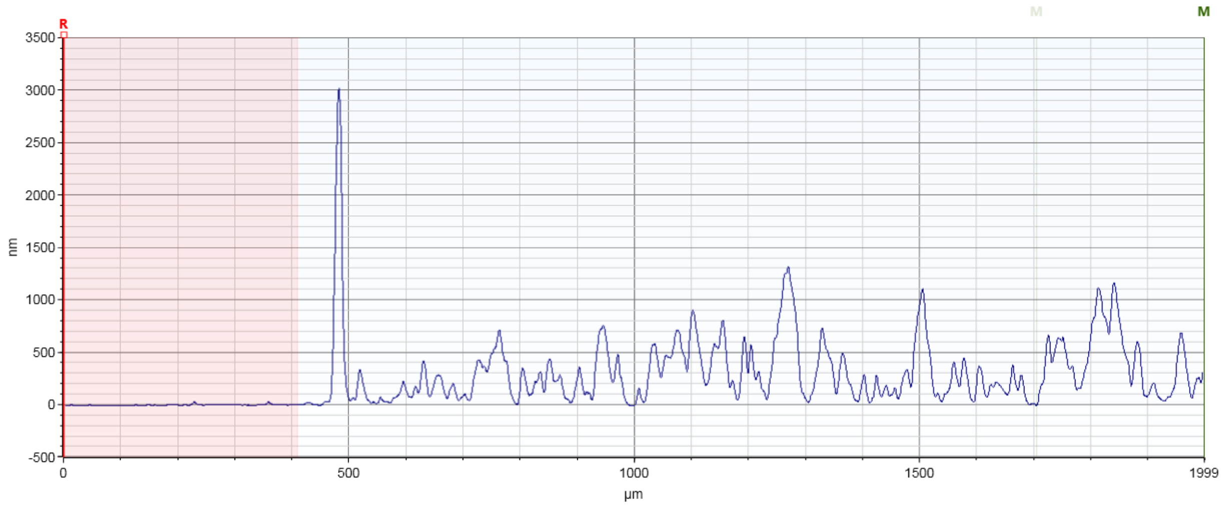

Figure S58. First profilometry scan of $\mathbf{P_{os}4}$ on ITO coated glass.

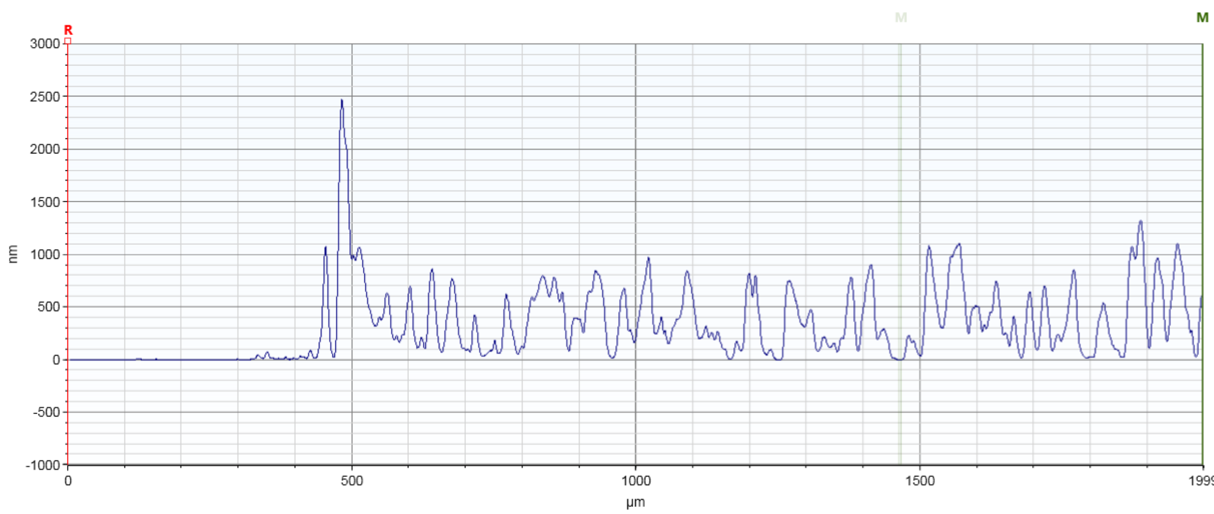

Figure S59. Second profilometry scan of $\mathbf{P_{os}4}$ on ITO coated glass.

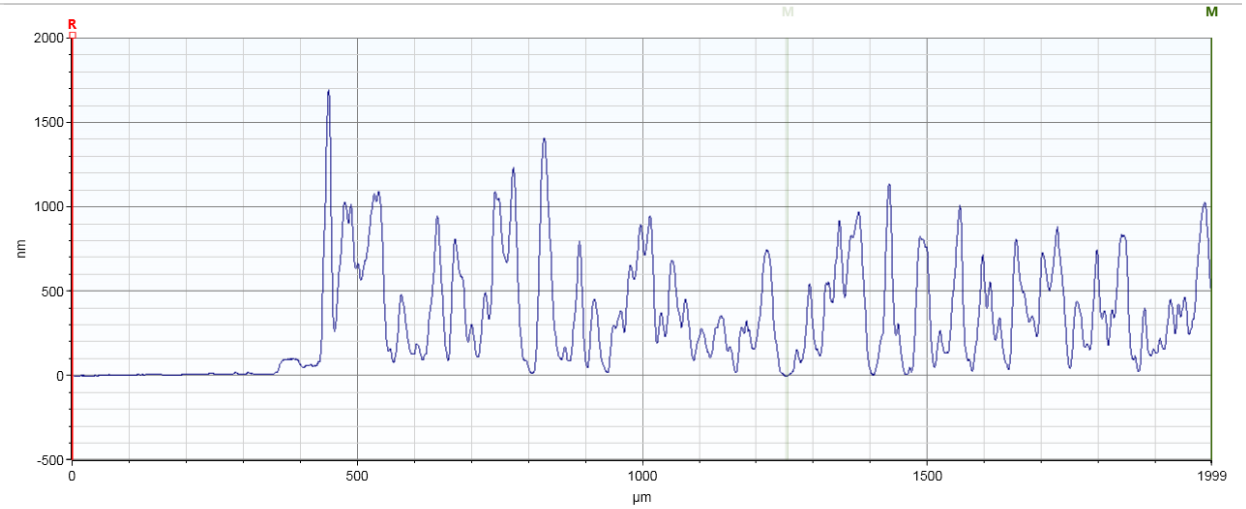

Figure S60. Third profilometry scan of $\mathbf{P_{os}4}$ on ITO coated glass.

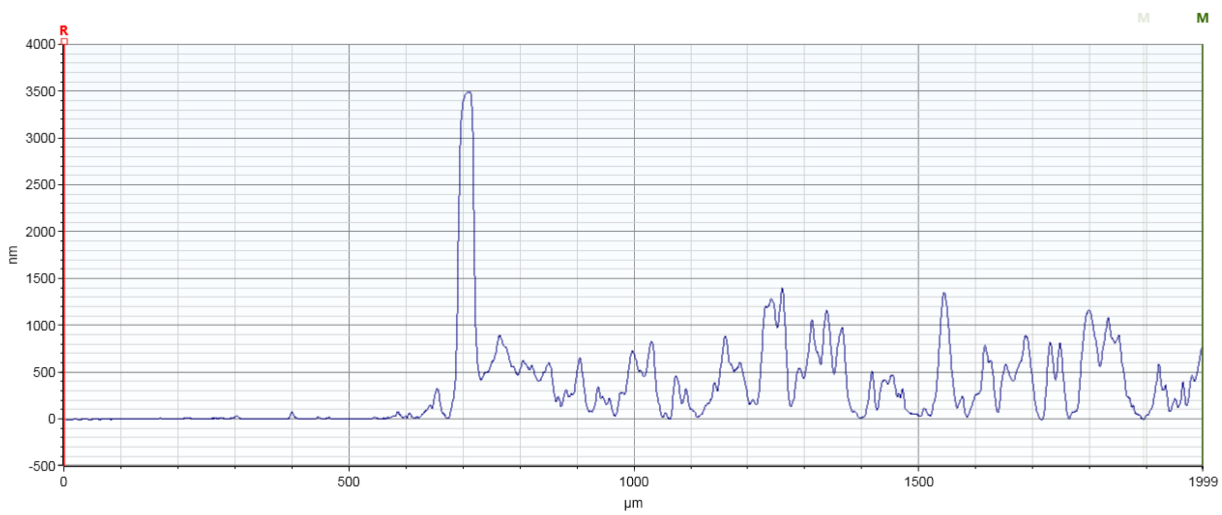

Figure S61. First profilometry scan of $\mathbf{P_{os}5}$ on ITO coated glass.

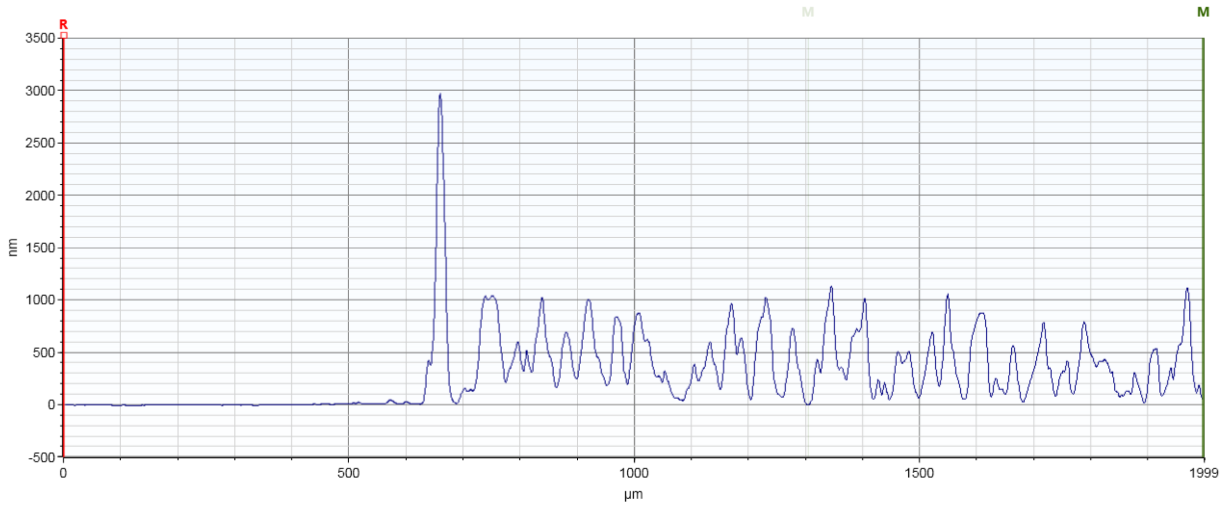

Figure S62. Second profilometry scan of $\mathbf{P_{os}5}$ on ITO coated glass.

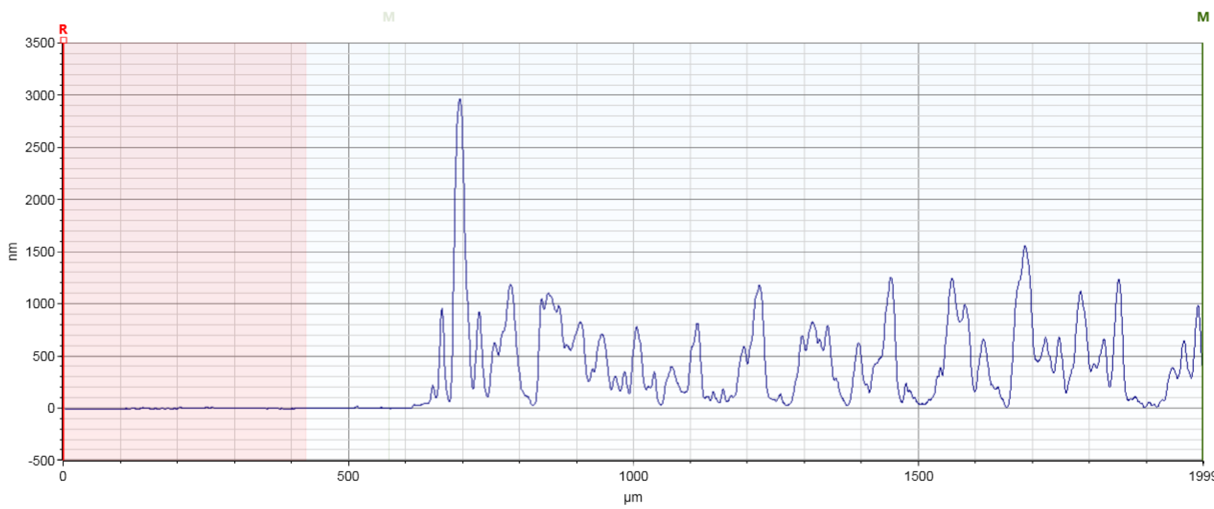

Figure S63. Third profilometry scan of $\mathbf{P_{os}5}$ on ITO coated glass.

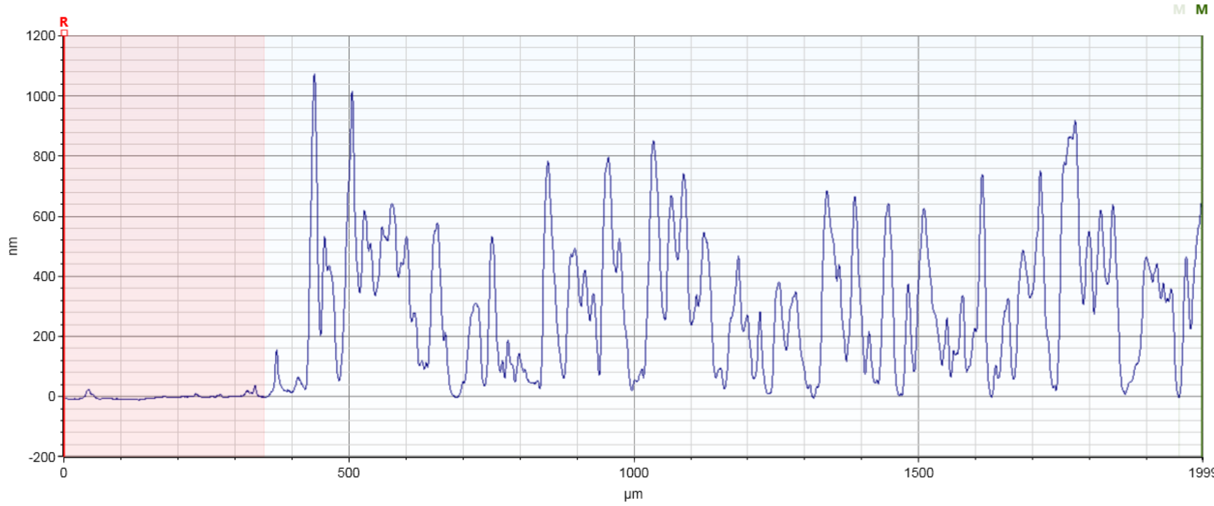

Figure S64. First profilometry scan of $\mathbf{P_{os}6}$ on ITO coated glass.

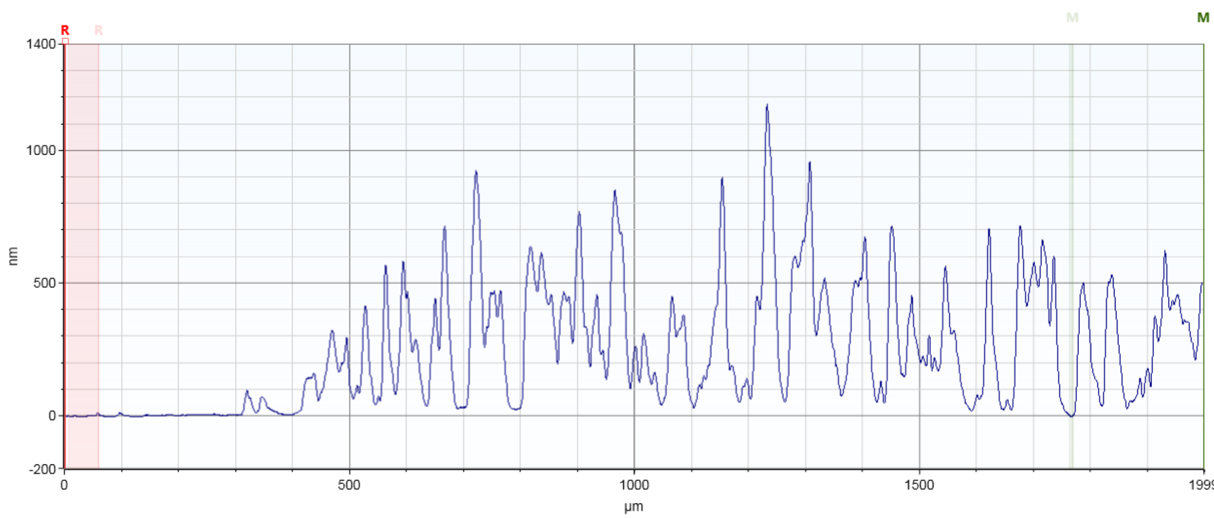

Figure S65. Second profilometry scan of $\mathbf{P_{os}6}$ on ITO coated glass.

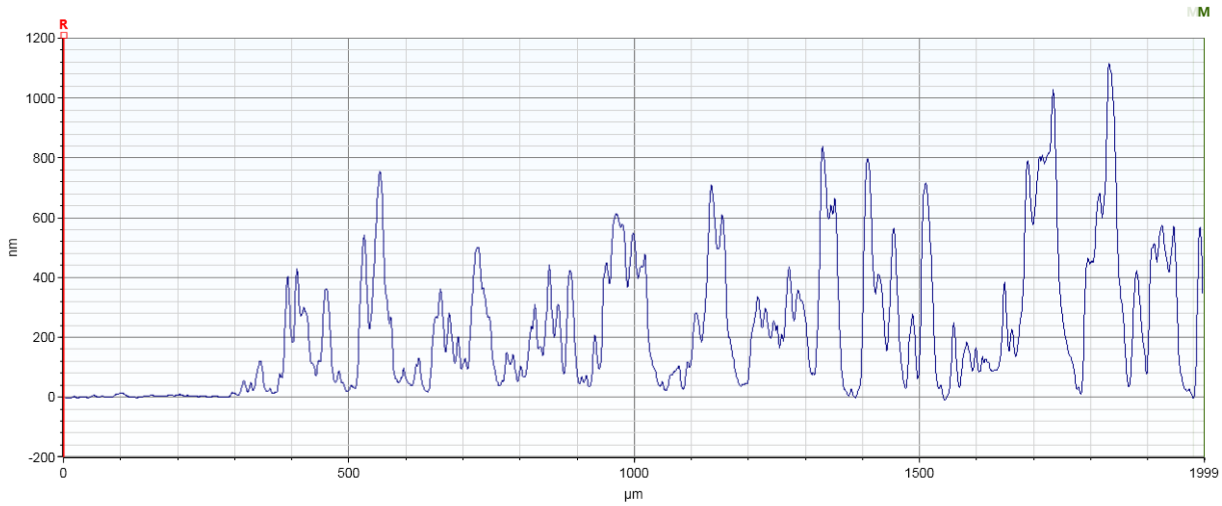

Figure S66. Third profilometry scan of $\mathbf{P_{os}6}$ on ITO coated glass.