

*Electronic Supplementary Information* for

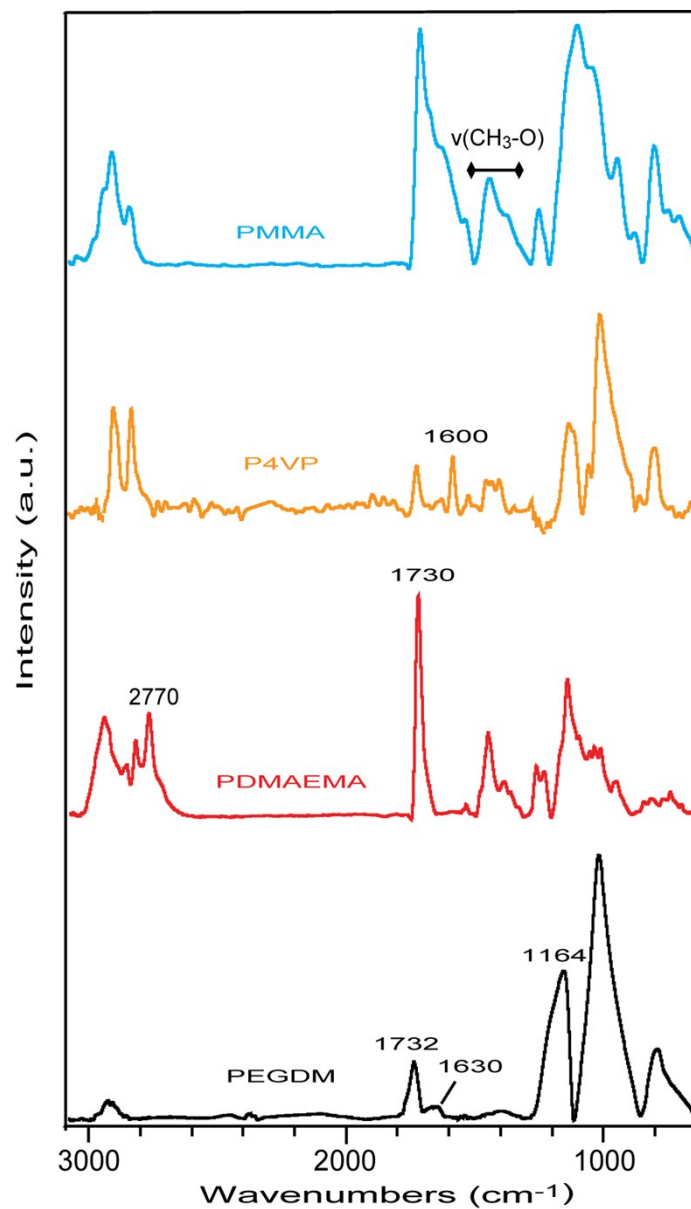
**Ultrathin Free-Standing Polymer Membranes with Chemically  
Responsive Luminescence via Consecutive Photopolymerizations**

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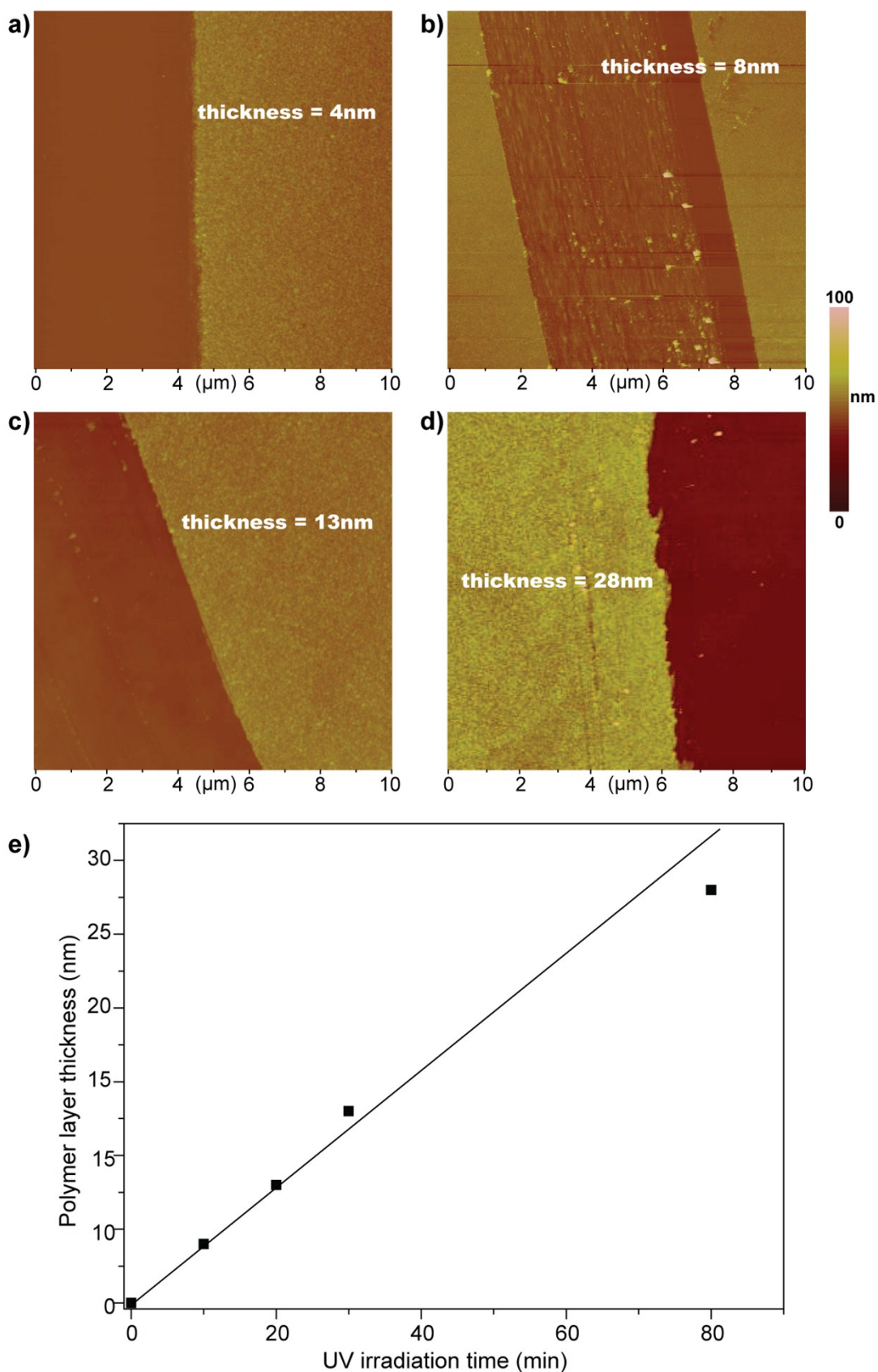
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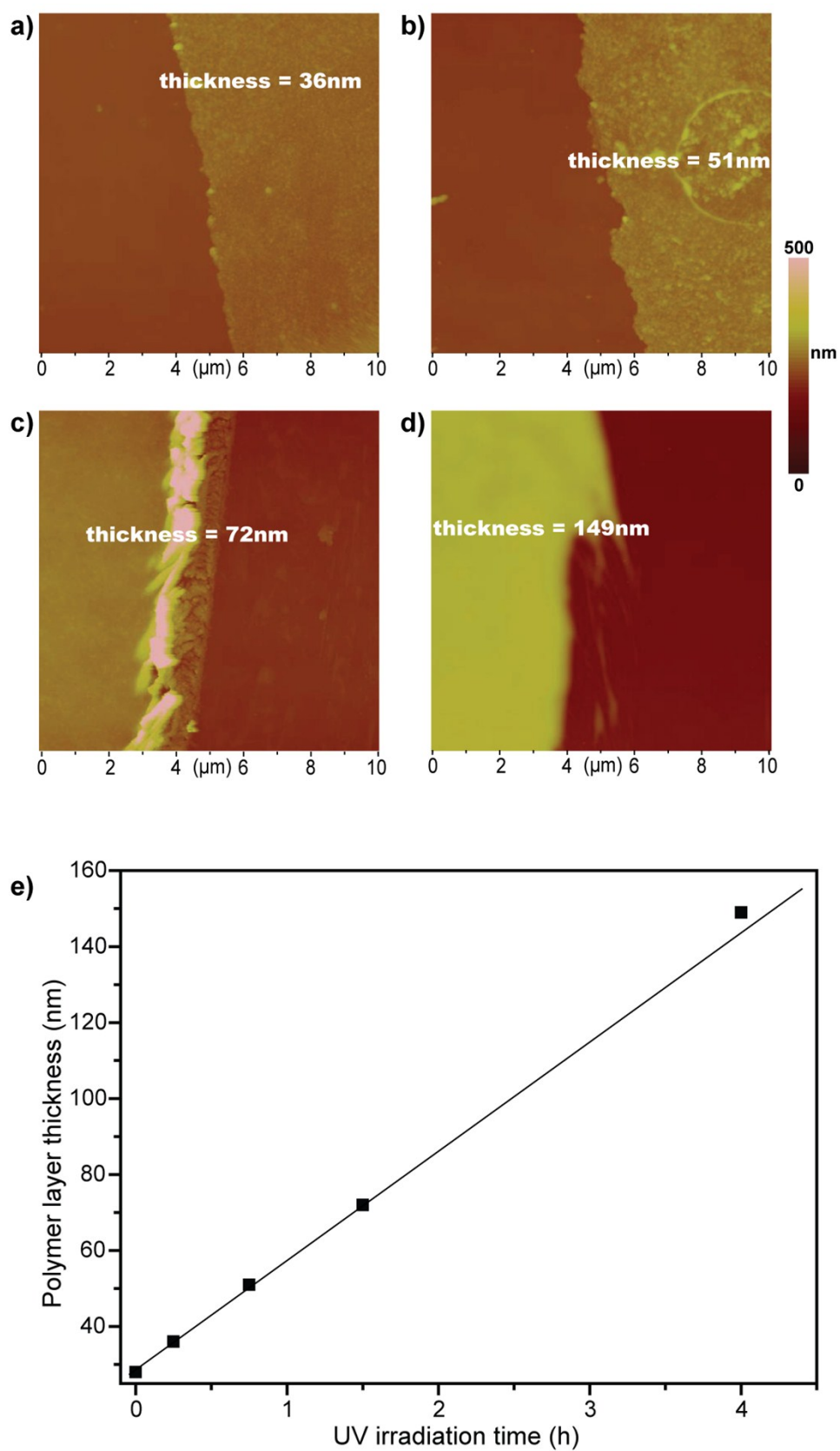
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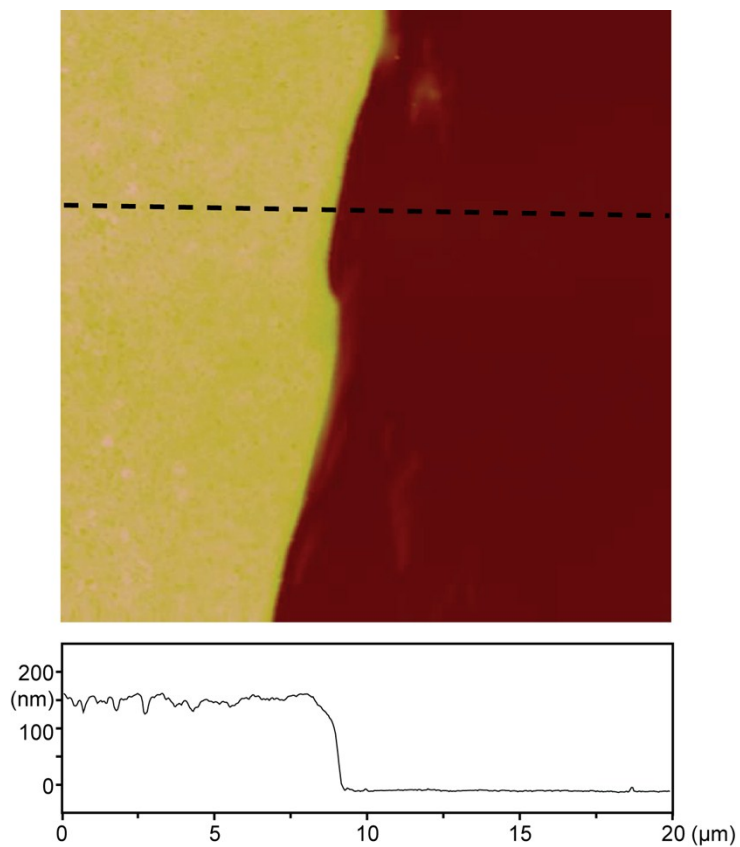
**Figure S1.** FTIR spectra of PEGDM network, PDMAEMA, P4VP and PMMA brushes on PEGDM.



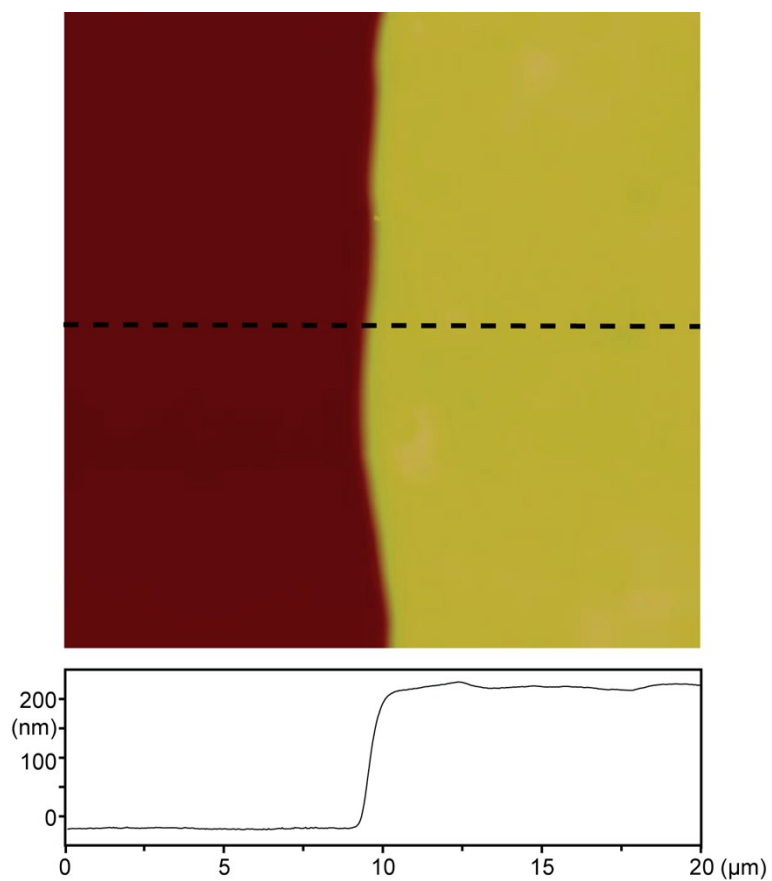
**Figure S2.** AFM scans of PEGDM thin film formed on SAM of TMSPA after different UV polymerization time of EGDM, i.e. 10min (a) , 20min (b), 30min (c) and 80min (d), and the plot of polymer layer thickness versus UV irradiation time (e).



**Figure S3.** AFM scans of PDMAEMA brushes on a 28nm thick PEGDM film after UV polymerization of DMAEMA for different polymerization time: 15min (a), 45min (b), 90min (c) and 4h (d), and the plot of polymer layer thickness versus UV irradiation time (e).



**Figure S4.** AFM scan of P4VP brushes on a 28nm thick PEGDM film.



**Figure S5.** AFM scan of PMMA brushes on a 28nm thick PEGDM film.