ACCSCIENCE PUBLISHING

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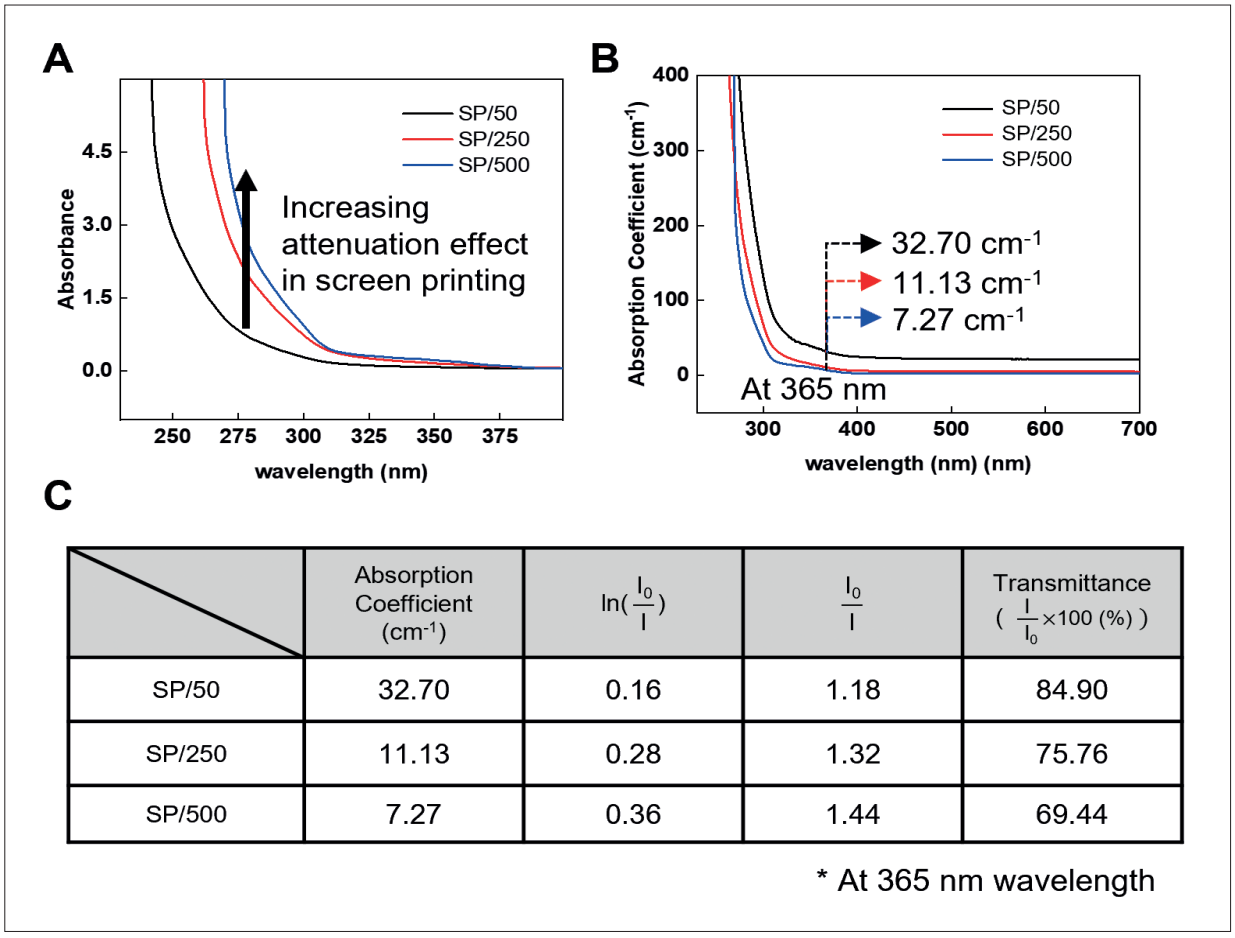
RESEARCH ARTICLE

Amphiphobic encapsulation for biodegradable electronics

Supplementary File



C

	Absorption Coefficient (cm^{-1})	$\ln(\frac{I_0}{I})$	$\frac{I_0}{I}$	Transmittance ($\frac{I}{I_0}\times 100$ (%))
SP/50	32.70	0.16	1.18	84.90
SP/250	11.13	0.28	1.32	75.76
SP/500	7.27	0.36	1.44	69.44

* At 365 nm wavelength

Figure S1. Transmittance properties of screen-printed PBTPAs (SP/50, SP/250, and SP/500) at 365 nm: (A) UV–vis absorbance; (B) absorption coefficient (α) measurements; (C) transmittance calculation for the screen-printed PBTPAs at 365 nm. Abbreviations: I, intensity of transmitted light; I_0: Intensity of incident light; PBTPA, Polybutanedithiol 1,3,5-triallyl-1,3,5-triazine-2,4,6(1H,3H,5H)-trione pentenoic anhydride; SP/50, Screen-printed 50 μm-thick film; SP/250: Screen-printed 250 μm-thick film; SP/500: Screen-printed 500 μm-thick film; UV–vis: Ultraviolet-visible light.

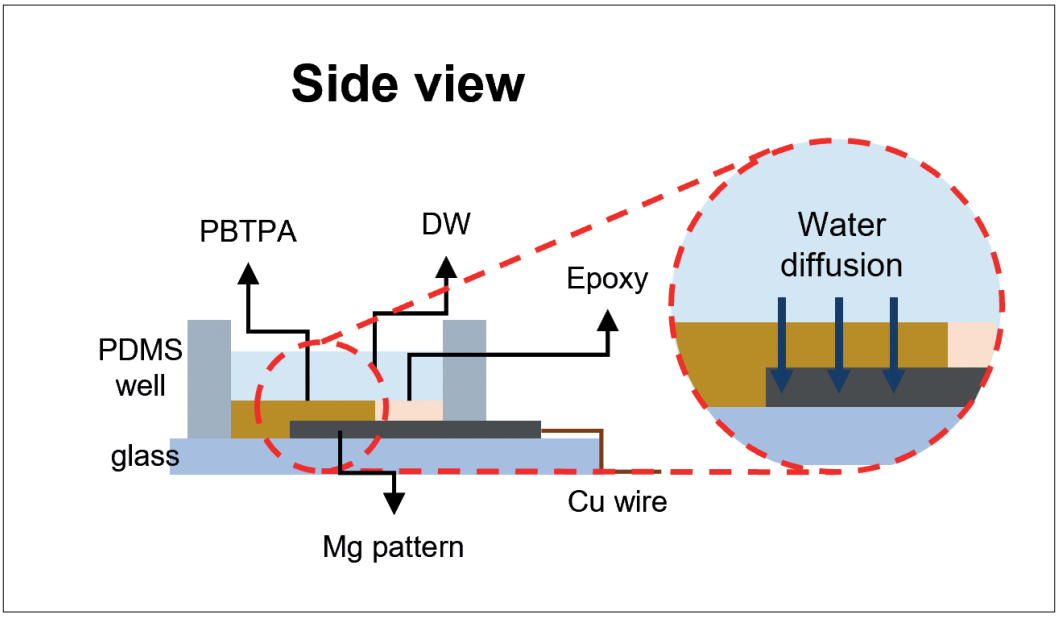


Figure S2. Electrical dissolution rate (EDR) test setup for evaluating the lifetime of each PBTPA experimental group. Abbreviations: DW, deionized water; PDMS, polydimethylsiloxane; PBTPA, polybutanedithiol 1,3,5-triallyl-1,3,5-triazine-2,4,6(1H,3H,5H)-trione pentenoic anhydride.

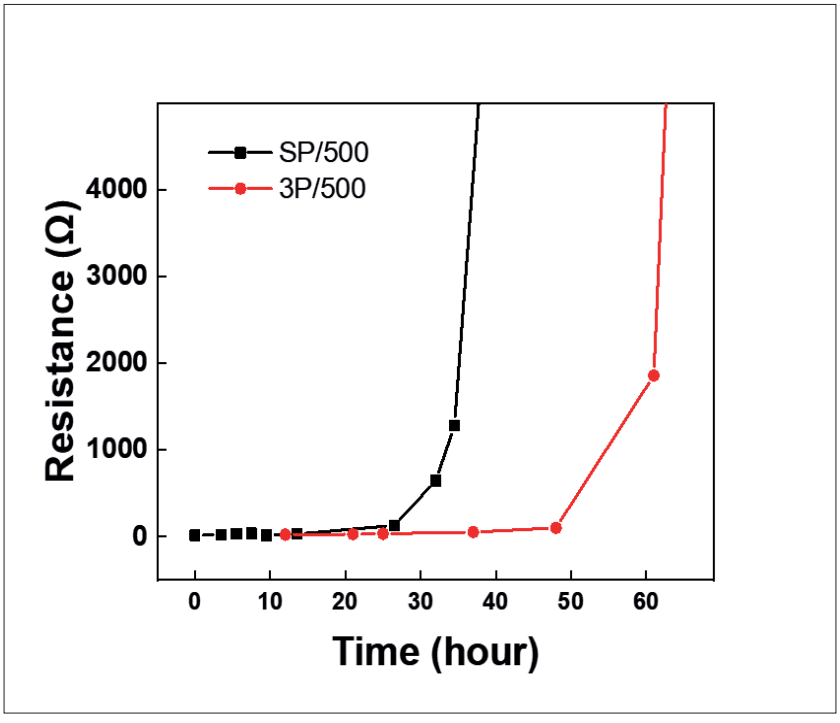


Figure S3. Changes in resistance between SP/500 and 3P/500. Abbreviations: 3P/500, 3D-printed 500-μm-thick film; SP/500: Screen-printed 500-μm-thick film.

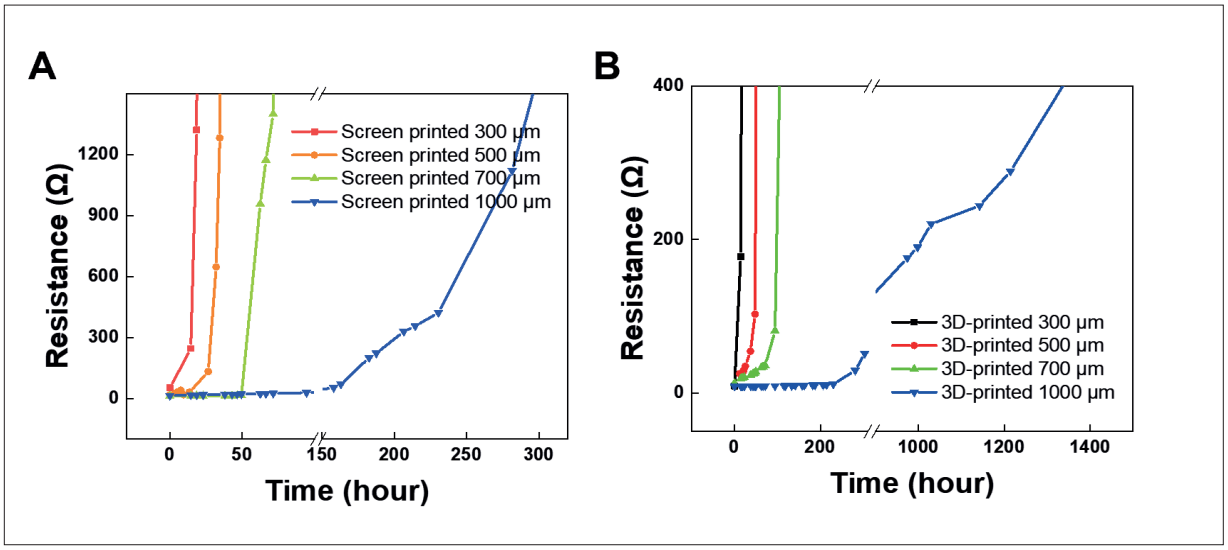


Figure S4. Change in resistance among (A) screen- and (B) 3D-printed PBTPAs (300 µm, 500 µm, 700 µm, and 1000 µm). Abbreviation: PBTPA: Polybutanedithiol 1,3,5-triallyl-1,3,5-triazine-2,4,6(1H,3H,5H)-trione pentenoic anhydride.

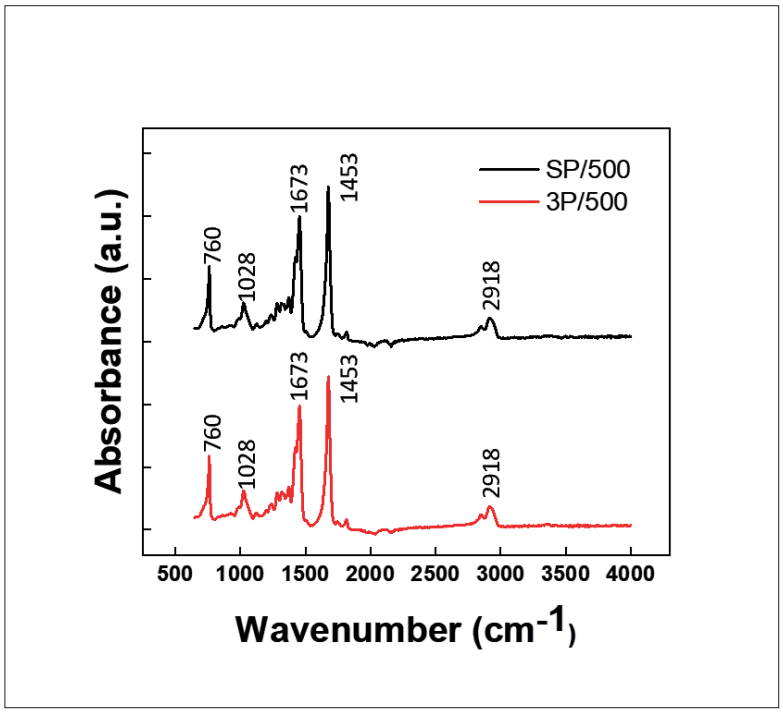


Figure S5. Fourier-transform infrared spectroscopy (FTIR) peaks for screen- and 3D-printed PBTPA layers displaying equivalent cross-linking between them. Abbreviations: PBTPA: Polybutanedithiol 1,3,5-triallyl-1,3,5-triazine-2,4,6(1H,3H,5H)-trione pentenoic anhydride; 3P/500: 3D-printed 500 µm-thick film; SP/500: Screen-printed 500 µm-thick film.

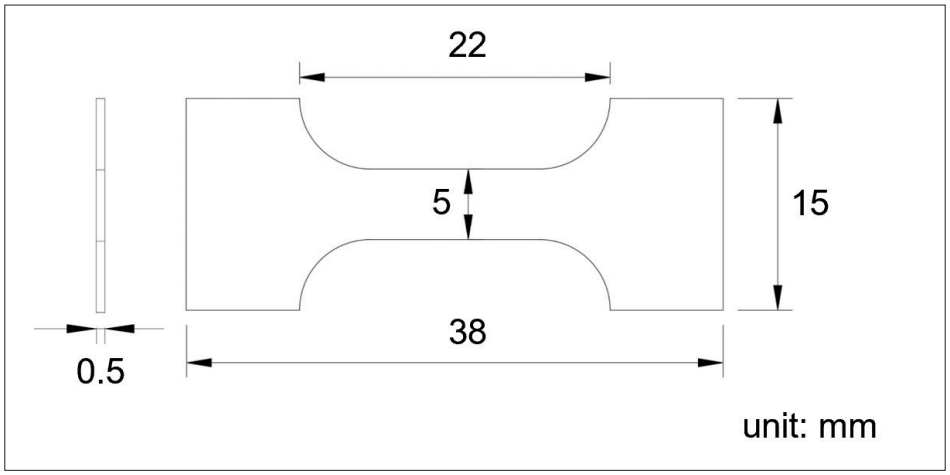


Figure S6. ASTM-D1708 standard for tensile test of PBTPA experimental groups. Abbreviation: PBTPA: Polybutanedithiol 1,3,5-triallyl-1,3,5-triazine-2,4,6(1H,3H,5H)-trione pentenoic anhydride.

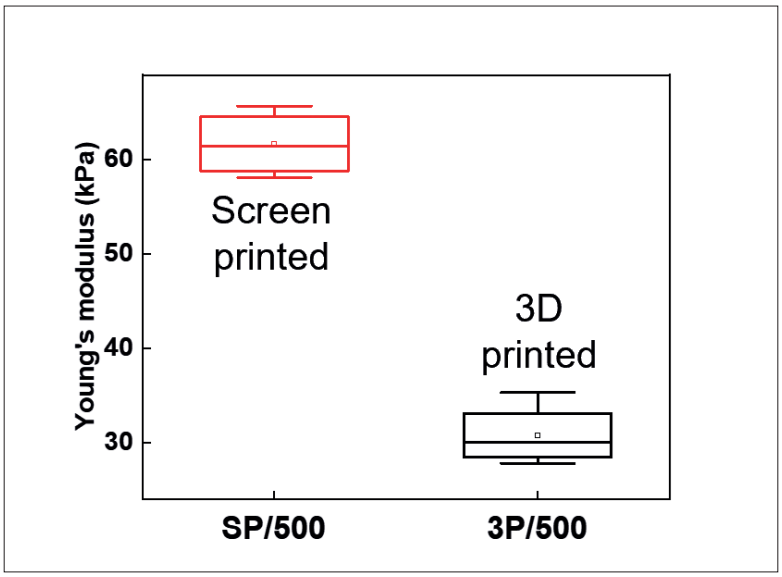


Figure S7. Box plot of Young's modulus for screen- or 3D-printed PBTPAs, reconstructed from **Figure 2B**, exhibits excellent mechanical reproducibility of 3D-printed polymers, with quartiles Q1, Q2, and Q3. Abbreviations: PBTPA: Polybutanedithiol 1,3,5-triallyl-1,3,5-triazine-2,4,6(1H,3H,5H)-trione pentenoic anhydride; 3P/500: 3D-printed 500 μm-thick film; SP/500: Screen-printed 500 μm-thick film.

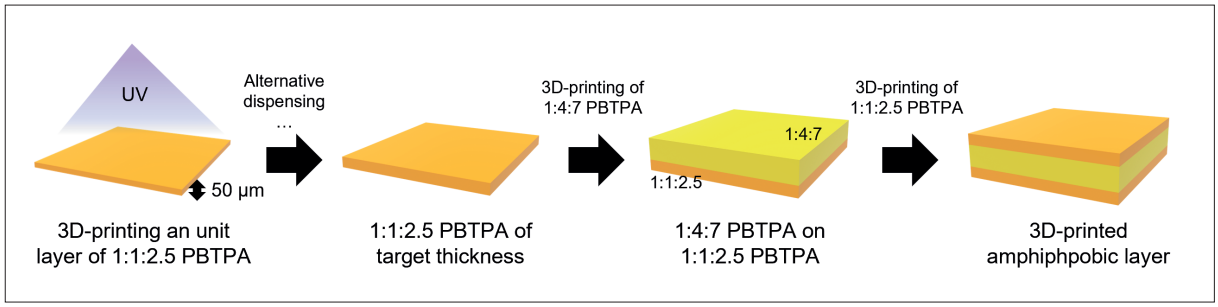


Figure S8. Schematic illustration of fabricating amphiphobic PBTPA layers. Abbreviations: PBTPA: Polybutanedithiol 1,3,5-triallyl-1,3,5-triazine-2,4,6(1H,3H,5H)-trione pentenoic anhydride; UV: Ultraviolet.

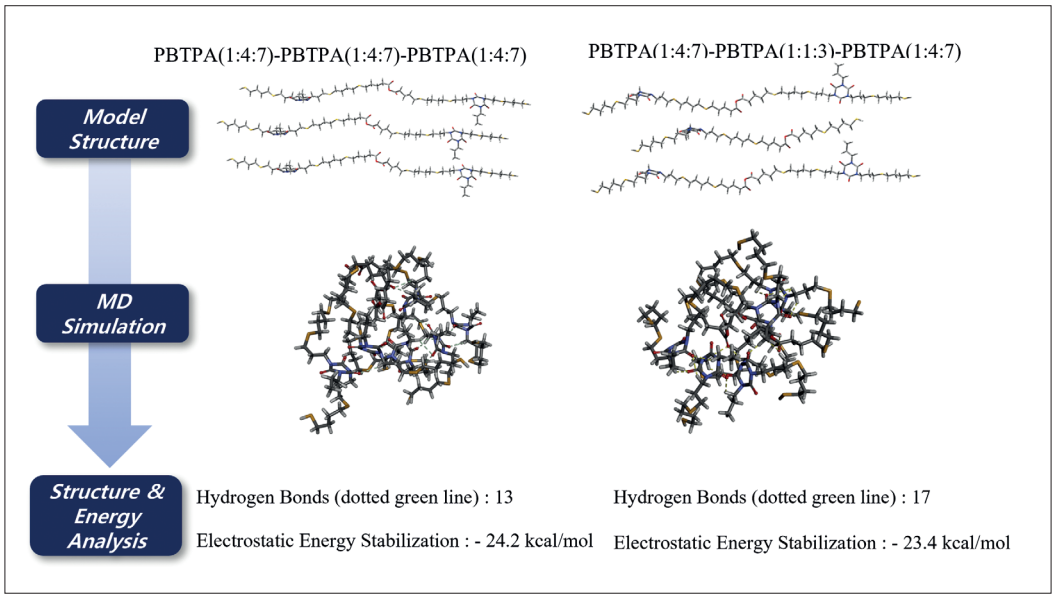


Figure S9. Molecular dynamic (MD) simulation outcomes for two PBTPA structures: a hydrophobic variant with three 1:4:7 PBTPA layers (left) and an amphiphobic model where a 1:1:3 PBTPA layer is sandwiched between 1:4:7 PBTPA layers (right). The structural configurations and results from structure and energy analyses highlight the differences in electrostatic energy stabilization and hydrogen bonding between the two systems. Abbreviation: PBTPA: Polybutanedithiol 1,3,5-triallyl-1,3,5-triazine-2,4,6(1H,3H,5H)-trione pentenoic anhydride.