Supporting Information

Tension-activated delivery of small molecules and proteins from superhydrophobic composites

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Materials and Reagents: Dichloromethane (reagent grade), ε-caprolactone (97%), tin(II) octoate (~95%), N,N'-dicyclohexylcarbodiimide (DCC, >99%), stearic acid (95%), cisplatin (99.9%), anhydrous toluene, anhydrous dimethylformamide (99.8%), chloroform (reagent grade), methanol (reagent grade), polycaprolactone (M_w = 45 kDa), β-galactosidase from *Aspergillus oryzae* (>8 units/mg), ortho-nitrophenyl-β-galactoside (>98% enzymatic), and OE33 cells were purchased from Sigma-Aldrich. Palladium on carbon catalyst (10% on activated wood carbon) was purchased from Strem Chemicals, Inc. FD&C Yellow 5 (0.7 w/v%) and Blue 1 (5 w/v%) were available from McCormick & Co (Hunt Valley, MD). Non-woven hydroentangled cellulose and polyester blended meshes were available from Texwipe. Premium heat-inactivated fetal bovine serum (FBS) was purchased from Atlanta Biologicals. RPMI 1640 was available through Gibco and phosphate-buffered saline (PBS) without Mg^{2+} and Ca^{2+} was available through Corning.

Device characterization: Water contact angles (advancing = 167°, receding = 143°) were measured with Kruss DSA100 goniometer. Mitutoyo 293 micrometer was used to determine depth of coating.

Substrate loading	Coating Thickness (100 µm)	Coating Thickness (200 µm)	Coating Thickness (350 µm)
Dye	113 +/- 11	205 +/- 35	360 +/- 21
β-galactosidase	107 +/- 9	187 +/- 20	364 +/- 30
Cisplatin	99 +/- 6	208 +/- 9	358 +/- 24

Table S1. Measured coating thickness of fabricated mechanoresponsive devices.

Samples were imaged by scanning electron microscopy with Zeiss ZUPRA 40VP field emission SEM (acceleration voltage = 2 kV). Samples were placed on aluminum stubs with double-sided copper tape and sputtercoated with 5 nm of gold-palladium alloy to reduce charging.

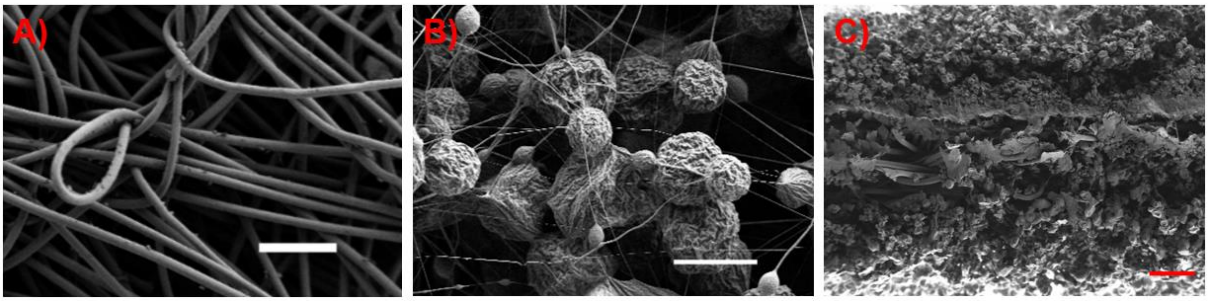

Figure S1. Scanning electron microscope images of A) core, B) coating, and C) composite with 100 µm coating. Scale bars = 100 µm, 10 µm, and 100 µm respectively.

Tension-mediated release: Devices were glued between two pieces of foam tape (3M Scotch), and placed between the grips of Instron 5848 tensile tester with 100 N load cell and submerged in a bath of PBS with 10% v/v FBS, or RPMI cell culture media (10% v/v FBS, cisplatin-loaded devices) with magnetic stir bar. All devices were stretched at 7% strain per second until the desired strain magnitude was reached. 2 mL aliquots were taken from the 300 mL bath at specified timepoints.

Dye concentrations were measured with HP 8453 UV-Visible spectrophotometer at 630 nm.

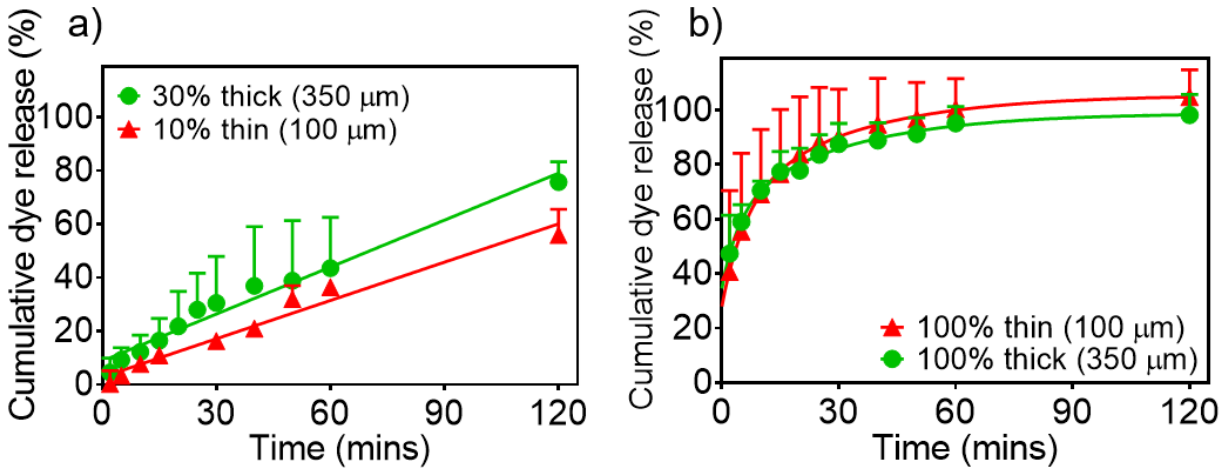

Figure S2. a) Similar release profiles of 100 µm coating at 10% strain and 350 µm coating at 30% strain. b) Release kinetics of dye from superhydrophobic coatings of 100 µm and 350 µm at 100% tensile strain. Error bars denote + SD, N = 3.

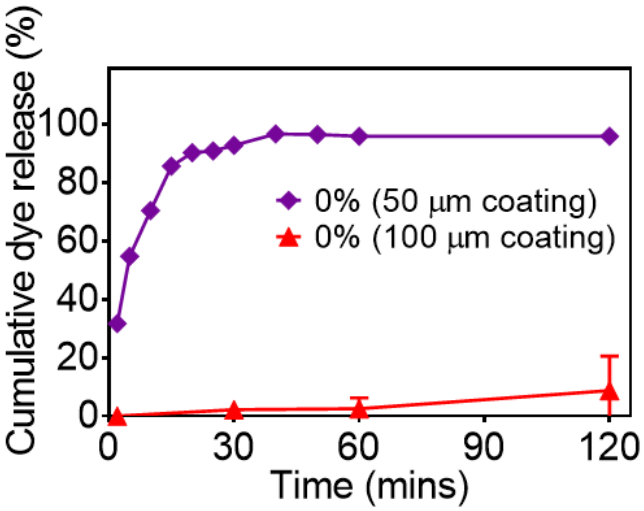

Figure S3. Release kinetics of dye in the absence of tensile strain (0%) with 100 µm superhydrophobic coating (N = 3, error bars = +/- SD) and 50 µm superhydrophobic coating (N = 1).