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Electronic Supporting Information: Mechanical behavior of SiNC layers on PDMS: Effects of layer thickness, PDMS modulus, and SiNC surface functionality

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Scanning electron microscopy (SEM) paired with focused ion beam (FIB) milling or physical scoring were used to estimate the thicknesses of the SiNC layers. Figure S-1a and b are example images from 5 min. and 30 min. deposition time on PDMS fabricated with $\alpha = 10$. For clarity, we also include in Fig. S-1c a top-down photograph of our sample apparatus for estimating the bifurcation onset angle, illuimated by an ultraviolet (UV) flashlight to show the luminescence of the sample (in this case, surface-functionalized SiNCs).

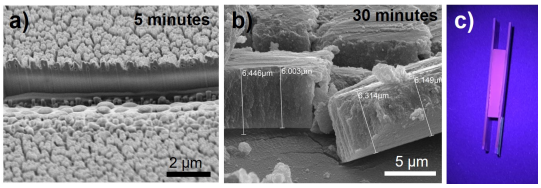

Fig. S-1 SEM imaging was used to estimate the SiNC layer thicknesses. (a) and (b) show example images from depositions of 5 min and 30 min., respectively. The PDMS was fabricated with $\alpha = 10$. (c) shows a top-down photograph of the sample apparatus for testing, with the aluminum handles sandwiching the PDMS/SiNC layer. The surface-functionalized sample was illuminated with a UV flashlight during the photograph, showing its luminescence.

FTIR confirmed the reaction of the SiNCs with alkyl chains for the functionalized samples.

Table S-1 Thickness measurements from SEM cross-sectional imaging for SiNC layers deposited on PDMS with varying α. Deposition time and standoff distance between the orifice and the PDMS substrate were kept constant

Ratio of base to curing agent in PDMS, α	Thickness of SiNC film [μm]
10	4.56 ± 0.31
12	4.41 ± 0.32
20	4.31 ± 0.50

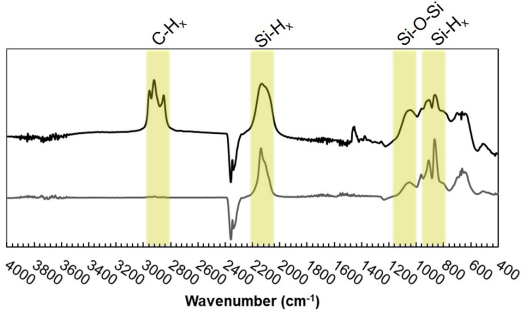

Fig. S-2 Bare SiNCs (bottom trace, in gray) show absorptions for Si-H_x species, while surface-functionalized SiNCs (top trace, in black) also contain evidence of C-H_x stretching vibrations near 2900 cm^{-1}. Both samples demonstrate a small amount of oxidation in the form of Si-O-Si absorption, which is expected as the FTIR measurements are performed in air.

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