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Supporting Information

Silane Nanodot Arrays by Capillary Nanostamping Coupled with Heterocyclic Silane Ring Opening

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Figure S1a



Figure S1b

Figure S1. SEM images of the c nanostamping. a) Overview; b) de



Figure S2. Photograph showing capitlary nanostamping. The mesoporous silica stamps (white-opaque) are glued onto elastomeric PDMS layers (transparent) that are in turn glued onto stamp holders made of steel. Using this configuration, the mesoporous silica stamps are manually approached to the substrates to be patterned.

us silica stamp used for capillary



Figure S3. Normalized and vertically shifted XP spectra of the Si 2p peak. a) XP spectrum (black curve) and Lorentzian fit (green curve) acquired on the non-patterned area of a glass slide. b) XP spectrum of an aminosilane nanodot array on the same glass slide (red curve) along with Lorentzian fits to the experimental XP spectra (blue and grey curves; the green curve is the sum of the blue and the grey curves). The XP spectra were measured at an electron take-off angle of 15° .



Figure S4. XP spectra of the N 1*s* peak taken on an aminosilane nanodot array (red curve; vertically shifted by 60 counts) and on a non-patterned area (black curve) of the same glass slide. The XP spectra were measured at an electron take-off angle of 15°.



Figure S5. a) Normalized XP spectra of the C 1*s* peaks of an aminosilane nanodot array (red curve) and a non-patterned area on the same glass slide (black curve). The XP spectra were measured at an electron take-off angle of 15°. b) Decomposition of the XP spectrum of the aminosilane nanodot array into a Lorentzian contribution presumably originating from carbon atoms in α -position to nitrogen atoms (grey curve) and a Lorentzian contribution of methyl- and methylene carbon atoms without more electronegative binding partners (blue curve). The sum of both Lorentzian functions is the green curve.



Figure S6a



Figure S6b

Figure S6. Raw TIRFM images of [*N*-(2-aminoethyl)-2-methyl-3-aminopropyl]dimethylsilane nanodot arrays on glass slides obtained capillary nanostamping of *N*-aminoethyl-aza-2,2-dimethyl-4-methylsila-cyclopentane after binding the dye ATTO 647 NHS to the terminal amine functions. a) 4th and b) 10th consecutive stamping cycle performed under ambient conditions without re-inking. Panels a) and b) have the same magnification. The scale bar in panel a) corresponds to 5 μ m. Insets are zoom-in regions of 5×5 μ m².



Figure S7a



Figure S7b



Figure S7c



Figure S7d



Figure S7e

Figure S7. Capillary nanostamping of 2,2-dimethoxy-1-thia-2-silacyclopentane on glass slides yielding arrays of dimethoxy-(3-thiopropyl)silane nanodots. a) Reaction scheme of the ring opening reaction with the surface OH groups. b)-e) TIRFM images of dimethoxy-(3-thiopropyl)silane nanodot arrays on glass slides after binding the dye ATTO 655 maleimide to the terminal thiol groups after b) the 1st, c) the 4th, d) the 7th and e) the 10th consecutive stamping cycle under ambient conditions without re-inking. The apparent median diameters of the thiosilane nanodots amounted to 314 nm ± 58 nm (1st stamping cycle), 318 nm ± 52 nm (4th stamping cycle), 334 nm ± 64 nm (7th stamping cycle) and 342 nm ± 60 nm (10th stamping cycle). The median nearest-neighbor distances amounted to 1.22 μ m ± 0.03 μ m (1st stamping cycle), 1.20 μ m ± 0.03 μ m (4th stamping cycle), 1.24 μ m ± 0.03 μ m (7th stamping cycle) and 1.21 μ m ± 0.03 μ m (10th stamping cycle). The raw TIRFM images were deconvolved using the Huygens software.



Figure S8a





Figure S8. TIRFM images of aminopropyltrimethoxysilane (APTMS) nanodot arrays stamped on glass slides after binding the dye ATTO 647 NHS to the terminal amine groups. Imaged are a) the result of the 1st and b) of the 4th consecutive stamping cycle under ambient conditions without re-inking. Panels a) and b) have the same magnification. The raw TIRFM images were deconvolved using the Huygens software.



Figure S9a



Figure S9b

Figure S9. SEM images of arrays of PS nanobrushes obtained by functionalization of [*N*-(2-aminoethyl)-2-methyl-3-aminopropyl]dimethylsilane nanodots with terminal amino groups via ARGET ATRP. a) Large-area image; b) larger-magnification image.



Figure S10. Raw TIRFM image of an array of [*N*-(2-aminoethyl)-2-methyl-3-aminopropyl]dimethylsilane nanodots functionalized with Halo-Tag®/mEGFP showing mEGFP fluorescence. The scale bar corresponds to 5 μ m. The inset is a zoom-in region of 5×5 μ m².