Electronic Supplementary Material (ESI) for Soft Matter.
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Supplementary Information for

Fluorescent Patterning of Paper Through Laser Engraving

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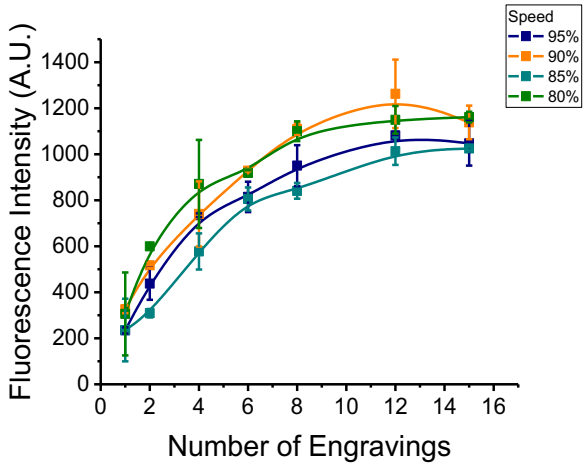

Figure SI 1a: Effect of the number of engraving steps on the fluorescence intensity. The power was fixed at 20% and the speed varied in the 80% - 95% range.

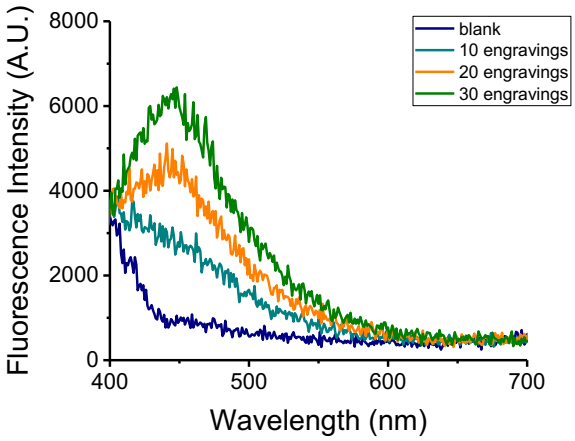

Figure SI 1b: Effect of the number of engraving steps on the fluorescence (peak emission). The power was fixed at 20% and the speed varied in the 80% - 95% range.

Tensile testing was conducted using an Applied Test Systems Series 900 Universal Testing Machine on single paper samples. For these experiments, the sample was shaped (dog-bone configuration) using the laser engraver (100% speed and 50% power), gradually tapering the width of the sample from the extremes (1.0 in, matching the size of the sample clamps) down to a rectangle of 0.75 in (width) x 1 in (length), placed in the center of the sample. To avoid any “edge effects” around the center portion, the samples were first rastered and then cut to shape. A photography of the samples (showing the placement of the engraved portion) is shown as Figure SI 2a. Tensile results shown in Figure SI 2b represent the average and standard deviation obtained from 4 replicates tested. This number was selected because it is the largest number of samples (of the size required for testing) that can be simultaneously engraved and cut out from single sheet of chromatography paper.

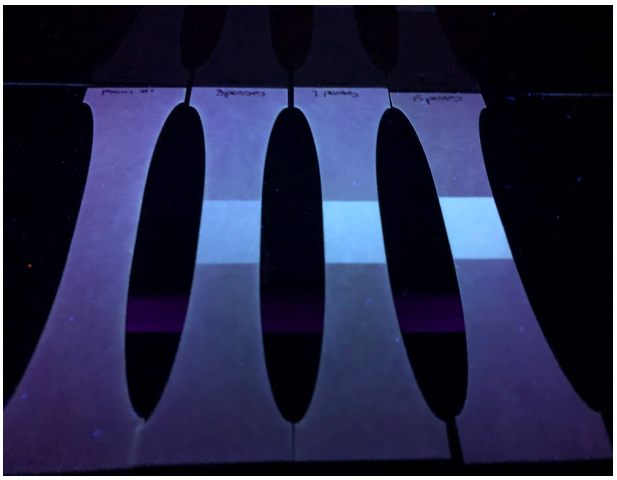

Figure SI 2a: Photography (under UV (365 nm) illumination of the samples prepared for strength testing. Samples were engraved using the raster mode at 95% speed and 20% power. The samples shown correspond to (left to right) plain paper, 3 passes, 7 passes, and 15 passes.

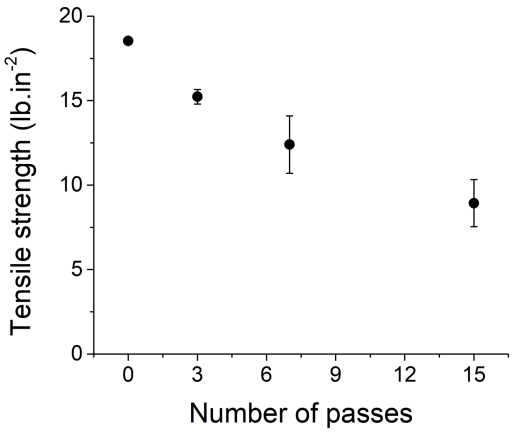

Figure SI 2b: Effect of the number of engraving steps on the tensile strength of the paper.

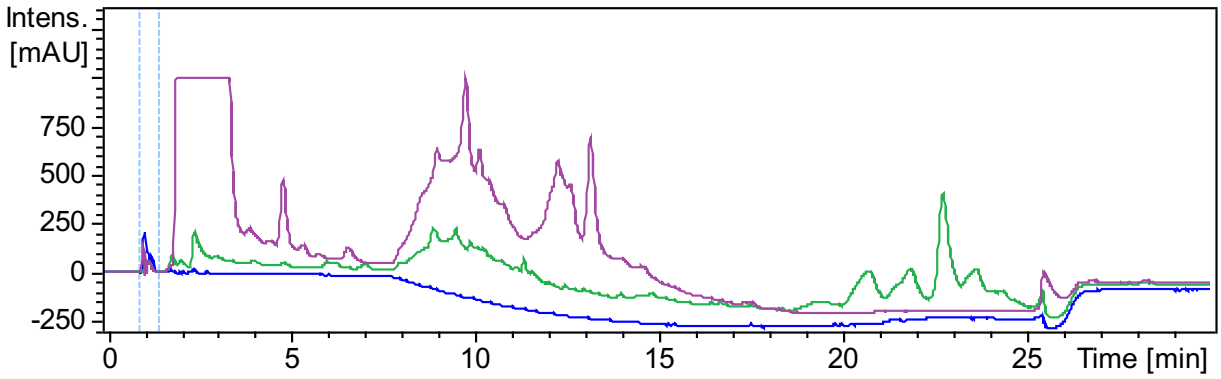

Figure SI 3: HPLC-FD chromatogram (EX 370 nm/Em 450 nm). Negative control (blue, untreated paper), paper submitted to laser irradiation (green), paper submitted to thermal carbonization (violet).

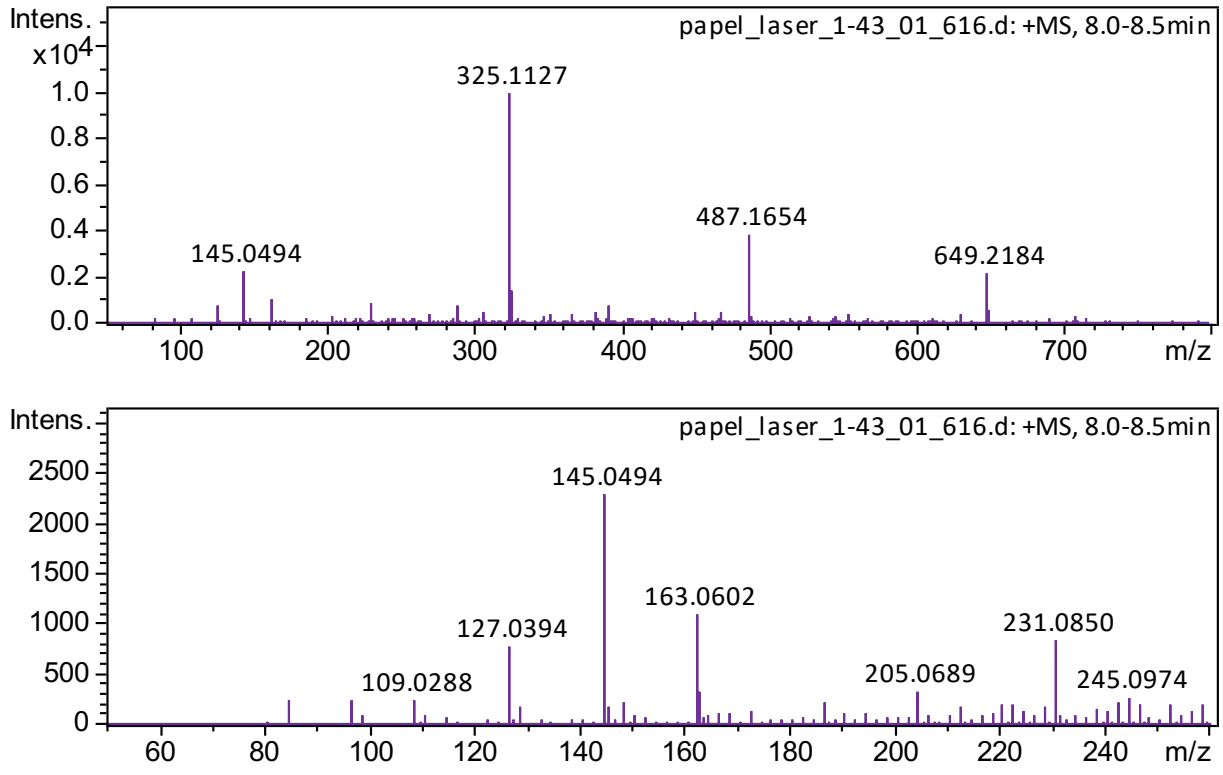

Figure SI 4: HRMS spectra of the species with retention time 8.0 to 8.5 min.

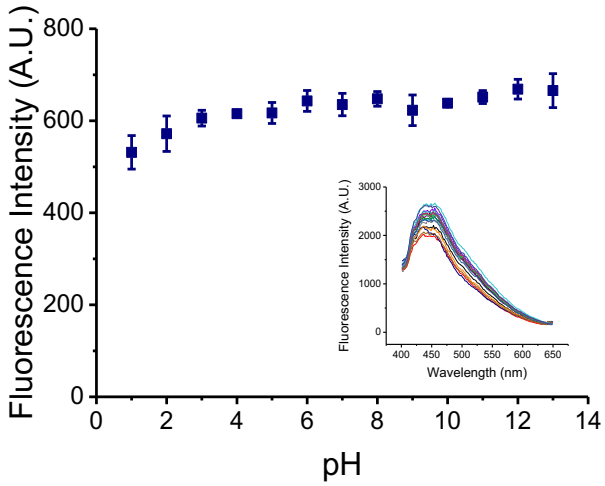

Figure SI 5: Effect of pH on the fluorescence intensity. A 0.1 M Na_3PO_4 solution was titrated to pH's ranging from 1-13 using NaOH and HCl and placed on the engraved paper (20% power, 95% speed, engraved 15 times). The fluorescence of the paper was measured using a fluorimeter, after extraction. It was found that the emission wavelength remained constant at 440 nm and there was little variation in fluorescent intensity.

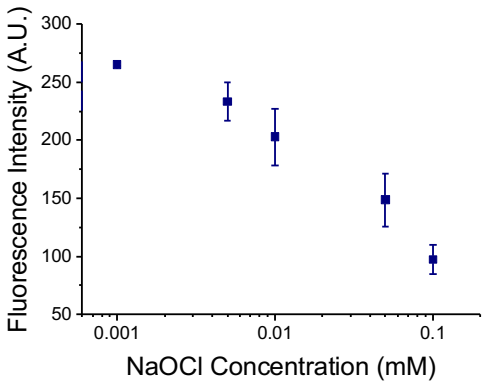

Figure SI 6a: Concentration dependent response of quenched fluorescence to sodium hypochlorite. Paper was treated with 20% power, 95% speed for 15 engravings. 4 µL of hypochlorite solutions were added to the rastered spots of paper. Fluorimeter Excitation: 365 nm, Emission: 440 nm (n=4)

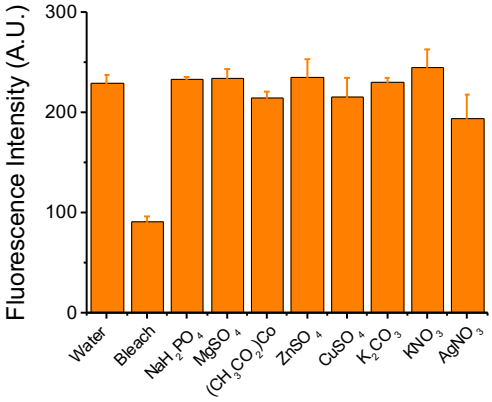

Figure SI 6b: Effect of common interferents on fluorescence of laser-engraved paper. Interferents were added to the rastered paper at a concentration of 10 mM (n=3).