Supplemental Material for:

Aerosol Jet Printing of SU-8 as a Passivation Layer Against Ionic Solutions

Authors: Shulin Ye[1], Nicholas X Williams[1], Aaron Franklin[1*].

1: Department of Electrical and Computer Engineering, Duke University. Durham, NC 27708.

*Corresponding author. Email: aaron.franklin@duke.edu. Phone: (919) 681-9471

Line Spacing:

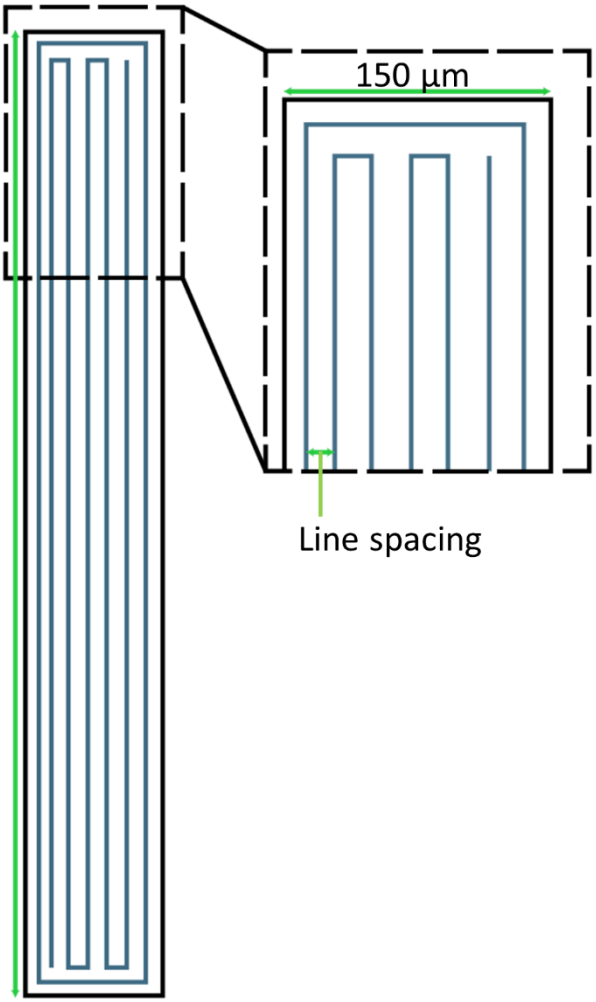

Figure S1: Diagram showing the path of the printer head in an aerosol jet printer. Because the aerosol jet printer produces lines, rectangles are created by printing many lines sufficiently close to each other. We have defined "line spacing" to be the spacing between the centers of these lines, as drawn the CAD software.

Printing parameters:

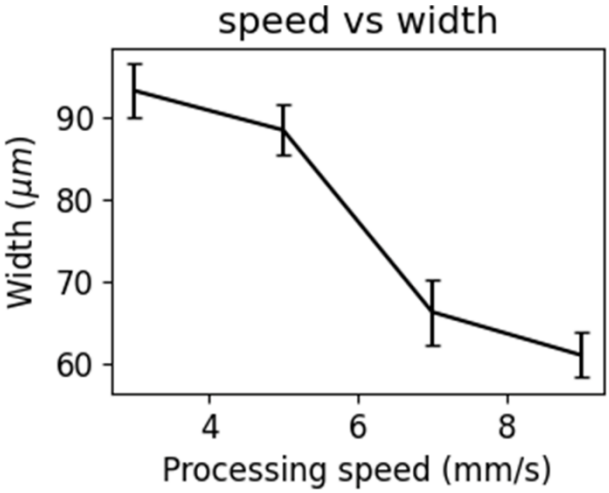

Figure S2: Width of printed SU-8 as compared to the printing speed. An increase in printing speed decreases line width. Error bars indicate standard deviation.

Dilutions:

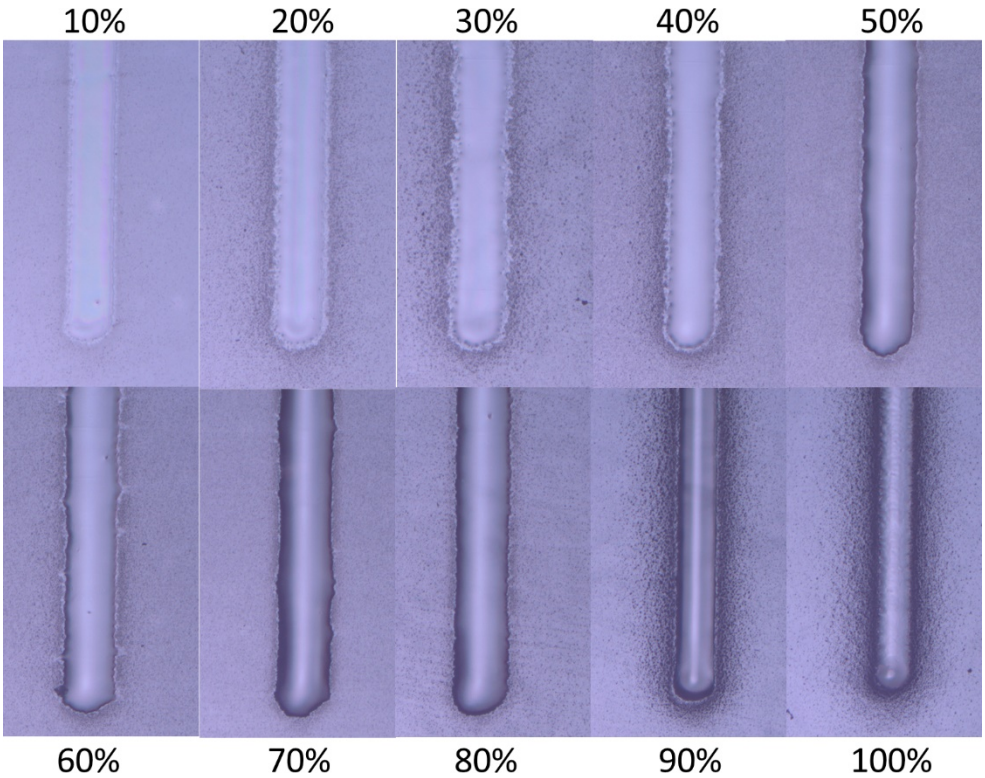

Figure S3: SU-8 was mixed with cyclopentanone and immediately used for printing using the previously optimized parameters (sheath flow 20 sccm, atomizer flow 20 sccm, at a speed of 7 mm/s) and optically imaged using a with all imaging parameters held constant. Overspray can be decreased by diluting SU-8 with cyclopentanone.

Removal of noise:

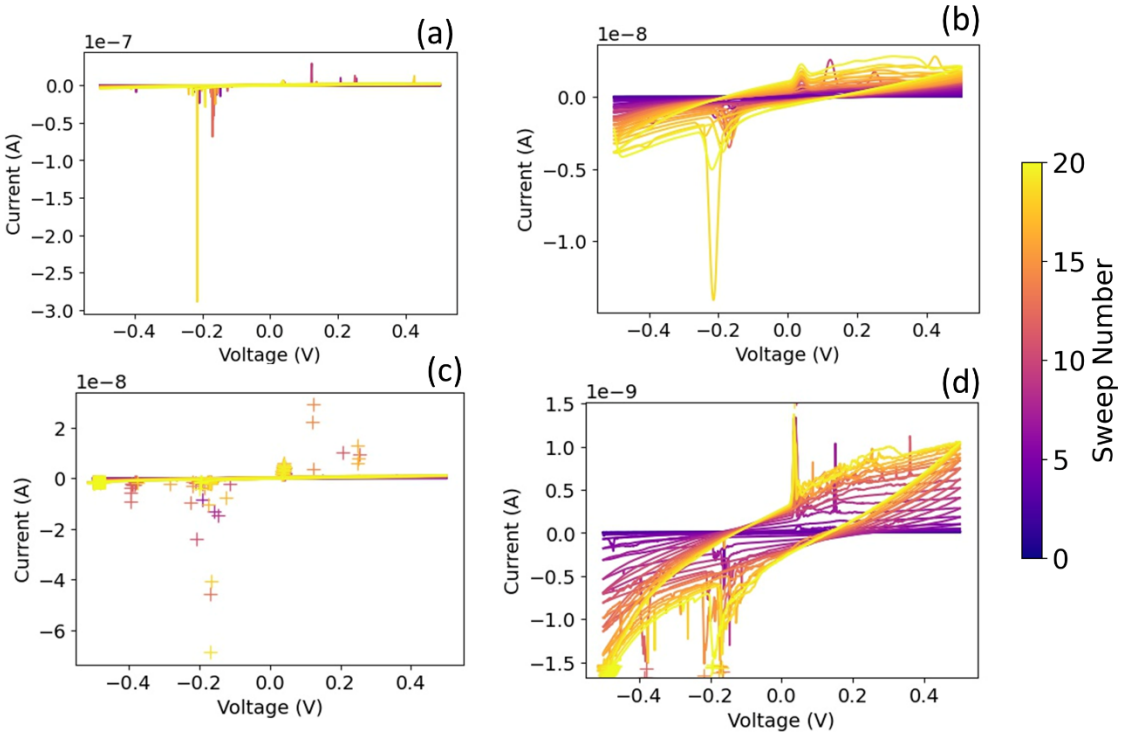

Figure S4: Using a 99.5th percentile cutoff removes extraneous peaks. (a) Some datasets show very thin, high peaks. (b) A low-pass (Hamming) filter does not do a good job removing the peaks. (c) A 99.5th percentile cutoff effectively removes most spikes, with the excluded data points marked with crosses. (d) Zooming in to look only at the remaining data points yields a more reasonable leakage curve where some noise remains, but much less. (y axis scale different than a-c).

Longitudinal Data:

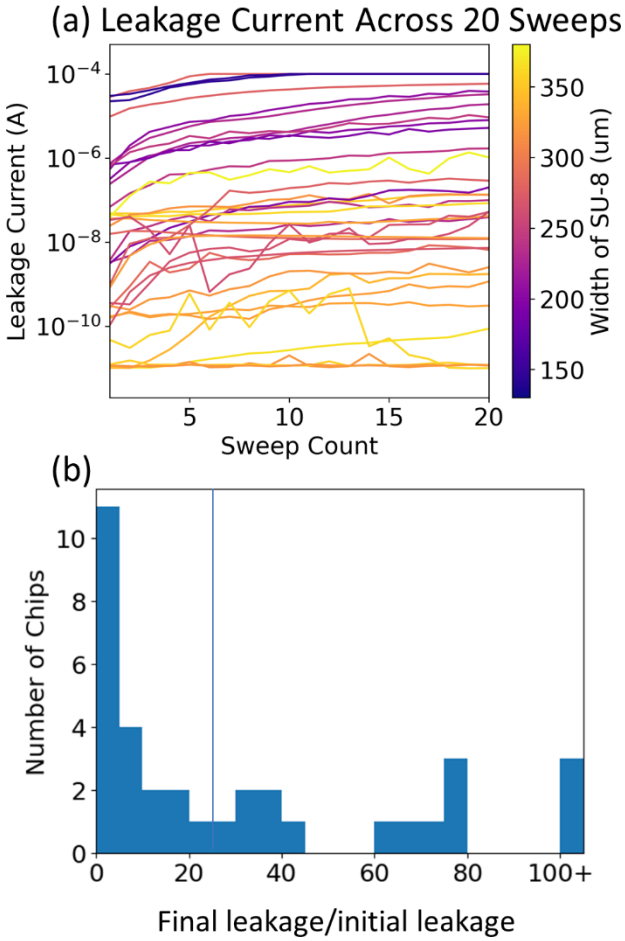

Figure S5: Degradation of passivation in the form of increased leakage current seen over time. (a) 99.5th percentile leakage current plotted against sweep count. (b) Histogram of leakage current on 20th sweep divided by leakage current on 1st sweep (degradation factor) shows that 11 out of 35 chips show a degradation factor below 5 and 20 out of 35 show a degradation factor below 25. Looking at the leakage measured in the first sweep and comparing it to the leakage in the last sweep, we see only a modest change.