

## Supplementary Information for

### **An Ink-Jet Printed, Roll-Coated Digital Microfluidic Device for Inexpensive, Miniaturized Diagnostic Assays**

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## Cost estimates for an ink jet printed and roll-coated digital microfluidic device

*Note: “Non-critical” materials are those that are not essential to device operation and can be replaced by much cheaper alternatives when scaled up for mass production.*

### Bottom Plate

*Silver Ink (critical):* The cost of the silver ink is US \$5/mL (i.e., US \$250 for 50 mL from NovaCentrix, Austin, TX). By weighing bare and dry printed substrates and taking into account the silver loading and density of the ink (load = 25% and  $\rho = 997$  g/L respectively) we calculated the cost of the ink per device to be US \$0.07.

*Bottom Plate Substrate (critical):* Bottom plate substrates are Novele IJ-220 inkjet printing media from NovaCentrix. In the NovaCentrix online store, 100 m x 0.15 m rolls are available for US \$120, for a cost of US \$0.03 for each 75 mm x 50 mm bottom plate substrate.

*CEP on Bottom Plate (critical):* Cyanoresin CR-S cyanoethyl pullulan can be purchased for US \$1.00/g and N,N-dimethylformamide solvent ( $\rho = 948$  g/L) can be purchased for US \$0.06/mL. A 20% wt/wt solution has  $\rho = 1025$  g/L and thus costs approximately US \$0.21/mL. With a Mini Roll Coater (MRC, FOM Technologies, Lyngby, Denmark) flow rate of 2.0 mL/min, drum speed of 0.33 m/min, roll length of 1 m, and 15 devices per roll, the volume of solution used per device is approximately 0.4 mL, a cost of US \$0.08.

*FluoroPel on Bottom Plate (critical):* FluoroPel 1101V has a cost of approximately US \$3.53/mL. With a MRC flow rate of 1.0 mL/min, drum speed of 0.67 m/min, roll length of 1 m, and 15 devices per roll, the volume of solution used per device is approximately 0.1 mL for a cost of US \$0.35.

*Bottom Plate Adhesive (non-critical):* Rolls of adhesive transfer tape F9460PC (4.57 m x 0.3 m) can be purchased from digikey.com for \$60.78 per roll, a cost of US \$0.24 per bottom plate.

*Bottom Plate Glass Slide (non-critical):* Bottom plate glass slides can be purchased for US \$0.50 each (75 mm x 50 mm x 0.7 mm from S.I. Howard Glass Co., Inc. Worcester, MA).

### Top Plate

*Top Plate Substrate (critical):* ITO-PET rolls (100 m x 0.3 m) can be purchased from MEMCON North America for US \$540, a cost of US \$0.03 for each 75 mm x 25 mm top plate substrate.

*FluoroPel on Top Plate (critical):* FluoroPel 1101V has a cost of approximately US \$3.53/mL. With a MRC flow rate of 1.0 mL/min, drum speed of 0.67 m/min, roll length of 1 m, and 79 top plates per roll, the volume of solution used per top plate is approximately 0.02 mL, a cost of US \$0.07.

*Top Plate Adhesive (non-critical):* Rolls of adhesive transfer tape F9460PC (4.57 m x 0.3 m) can be purchased from digikey.com for US \$60.78 per roll, a cost of US \$0.12 per bottom plate.

*Top Plate Glass Slide (non-critical):* Top plate glass slides are made from bottom plate glass slides (cut in half) for a cost of US \$0.25 each.

**Supplementary Table S1. Cost of Critical Components per Device**

Component	Cost (USD)
Silver Ink	\$0.07
Substrate (Bottom Plate)	\$0.03
CEP	\$0.08
FluoroPel (Bottom Plate)	\$0.35
Substrate (Top Plate)	\$0.03
FluoroPel (Top Plate)	\$0.07
Total	\$0.63

**Supplementary Table S2. Cost of All Components per Device**

Component	Cost (USD)
Silver Ink	\$0.07
Substrate (Bottom Plate)	\$0.03
CEP	\$0.08
FluoroPel (Bottom Plate)	\$0.35
Adhesive (Bottom Plate; non-critical)	\$0.24
Glass Slide (Bottom Plate; non-critical)	\$0.50
Substrate (Top Plate)	\$0.03
FluoroPel (Top Plate)	\$0.07
Adhesive (Top Plate; non-critical)	\$0.12
Glass Slide (Top Plate; non-critical)	\$0.25
Total	\$1.74