**SUPPORTING INFORMATION**

# Coated and Uncoated Cellophane as Materials for Microplates and Open-channel Microfluidics devices

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**Mechanisms of proline/$Ru(bpy)_3^{2+}$ based ECL**

$Ru(bpy)_3^{2+} \rightarrow Ru(bpy)_3^{3+} + e^-$ (1)

$Proline + Ru(bpy)_3^{3+} \rightarrow [proline^+]^\bullet + Ru(bpy)_3^{2+}$ (2)

$[proline^+]^\bullet \rightarrow [proline]^\bullet + H^+$ (3)

$Ru(bpy)_3^{3+} + [proline]^\bullet \rightarrow [Ru(bpy)_3^{2+}]^* + products$ (4)

$[Ru(bpy)_3^{2+}]^* \rightarrow Ru(bpy)_3^{2+} + h\upsilon$ (light) (5)

**Calculation of pressure drops in microfluidic channels**

In a cylindrical pipe of uniform diameter $D$, flowing full, the pressure loss due to viscous effects per unit length $\Delta p/L$ (SI units Pa/m) can be characterized by the Darcy Weisbach equation:

$$\frac{\Delta p}{L} = f_D \frac{\rho V^2}{2\, D}$$

Where $f_D$ is the Darcy friction factor and for laminar flow it is equal to 64/Re where Re is the Reynolds number. $D$ is the hydraulic diameter, $\rho$ is the density of the fluid, $V$ is the mean velocity of the fluid, $Q/A$, $P$ is the wetted perimeter, and $A$ is the cross-sectional area.

This equation can also be written as

$$\frac{\Delta p}{L} = 2\mu Q \frac{P^2}{A^3}$$

Where, μ is the viscosity of the fluid, $Q$ is the volumetric flow rate. We measured the wetted perimeter and the cross-sectional area from the cross-section images of the channels (see the photographs in Figure 4E, 4F). We estimated the pressure drops for water at 25 °C flowing at 200 μL/min for 1000 μm channel as 5 kPa and 500 μm channel as 70 kPa. 200 μL/min was the maximum flow-rate that we measured.

**Figures and Tables**

**Table S1.** Analytical figures of merit for absorption of different analytes, in PVC coated cellophane well plates (95% CI, n = 7). The absorption measurements were done by placing 10 µL of solution in each well and sealing the wells with an adhesive tape (adhesive silicone film for PCR plates).

| | **Nitrocellulose coated cellophane $C^{NS}$** | | **PVC coated cellophane $C^{PVC}$** | |
|---|---|---|---|---|
| **Analyte, $\lambda_{max}$ (nm, Measured range (µg/mL)** | **$R^2$** | **LOD (µg/mL)[a]** | **$R^2$** | **LOD (µg/mL)[a]** |
| Thiamine (238 nm) (20-500 µg/mL) | 0.981 | 16 | 0.994 | 9 |
| Acetaminophen (242 nm) (20-500 µg/mL) | 0.977 | 18 | 0.973 | 19 |
| Adenine (260 nm) (2.6-675 µg/mL) | 0.997 | 8 | 0.996 | 9 |
| BSA (280 nm) (70-2000 µg/mL) | 0.986 | 527 | 0.978 | 670 |

[a] LOD = 3.3($S_y$ / S), $S_y$ =Standard deviation of the intercept, S=Slope

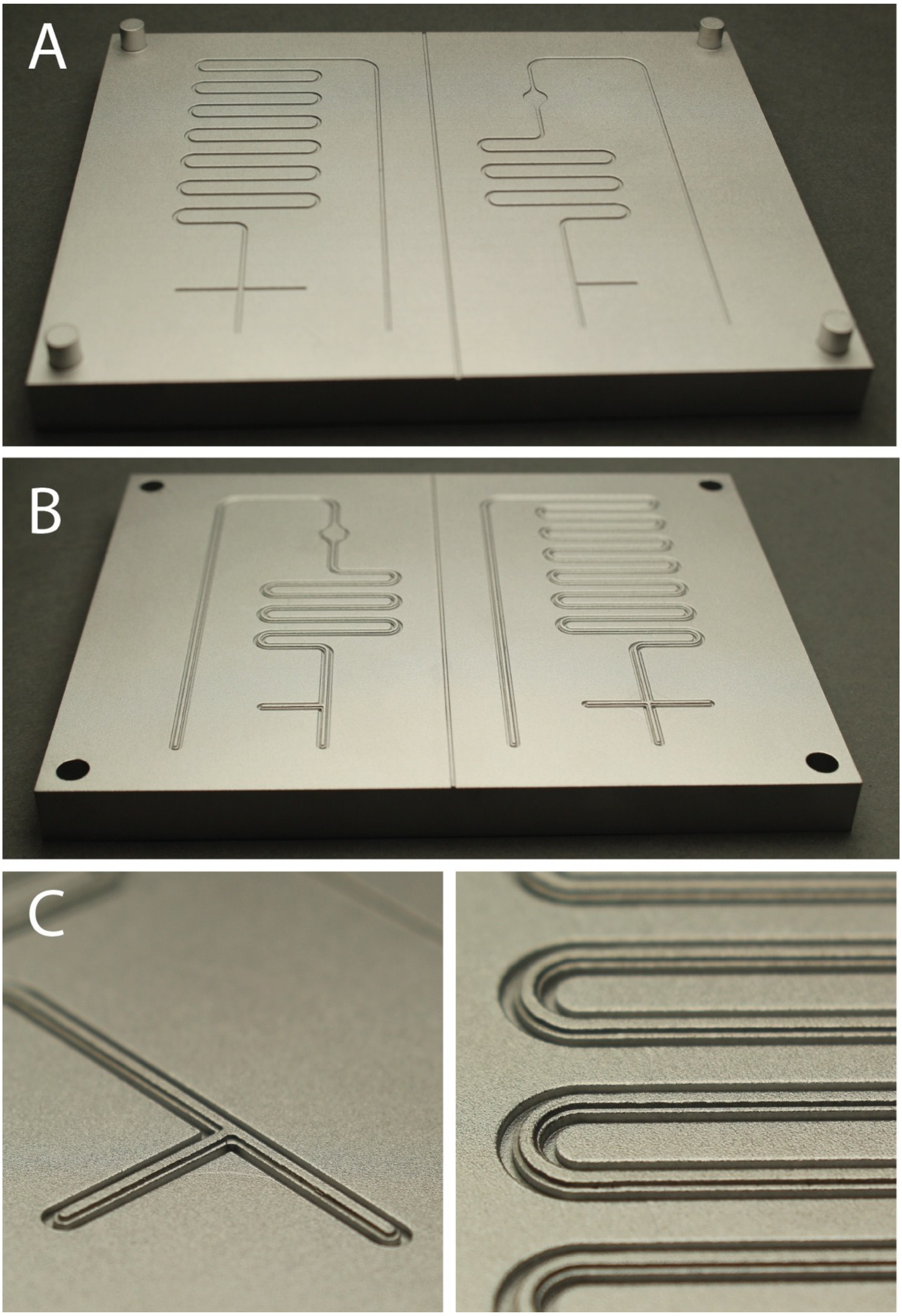


**Figure S1.** Photographs of molds made in brushed aluminum with CNC machining, used for the fabrication of microfluidic devices (channel width 500 µm). A) Negative mold (indented structures). B,C) Positive mold (protruded structures)

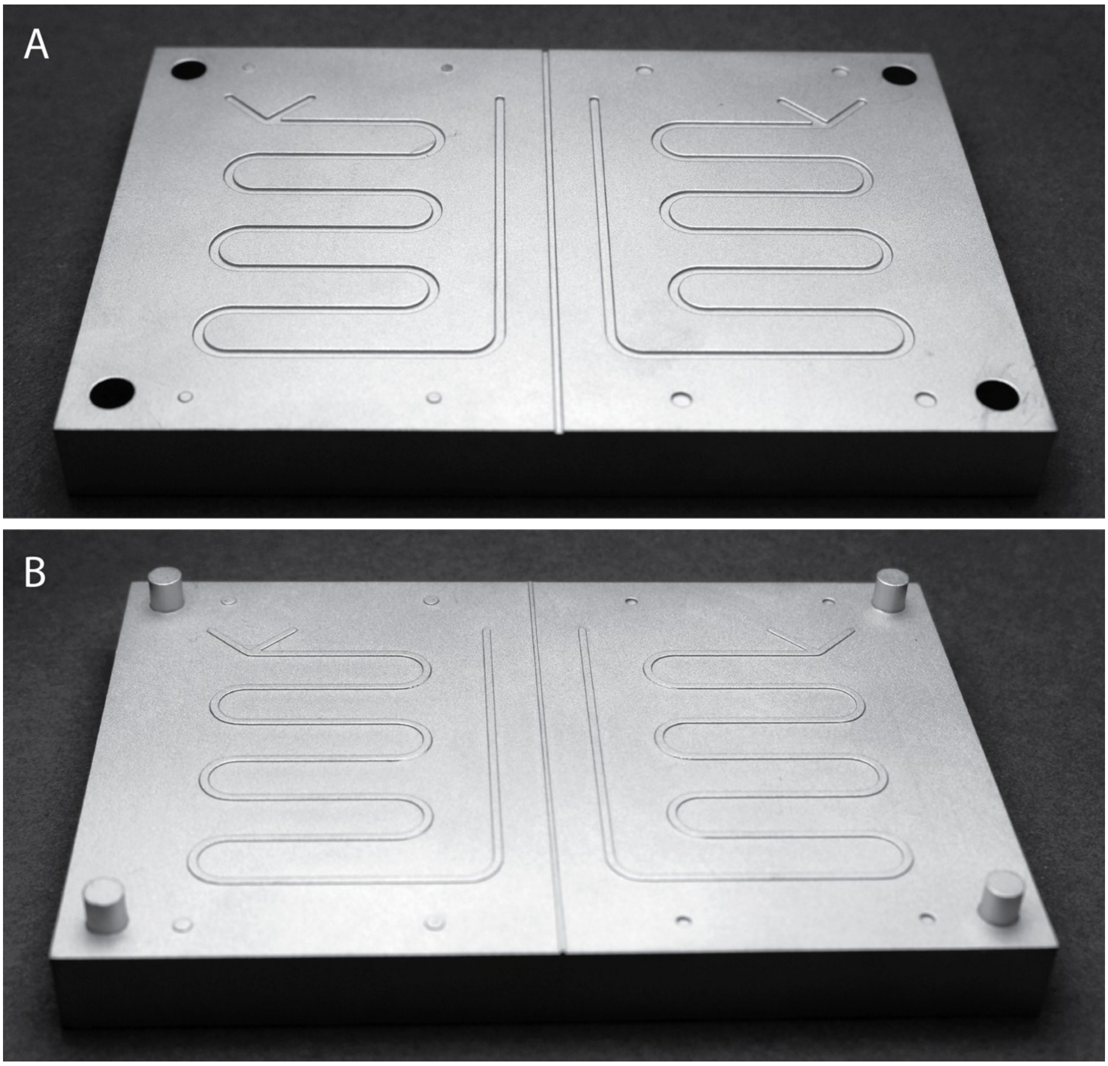


**Figure S2.** Photographs of molds made in brushed aluminum with CNC machining, and used for the fabrication of microfluidic devices (channel width 1 mm). A) Negative mold (indented structures). B,C) Positive mold (protruded structures)

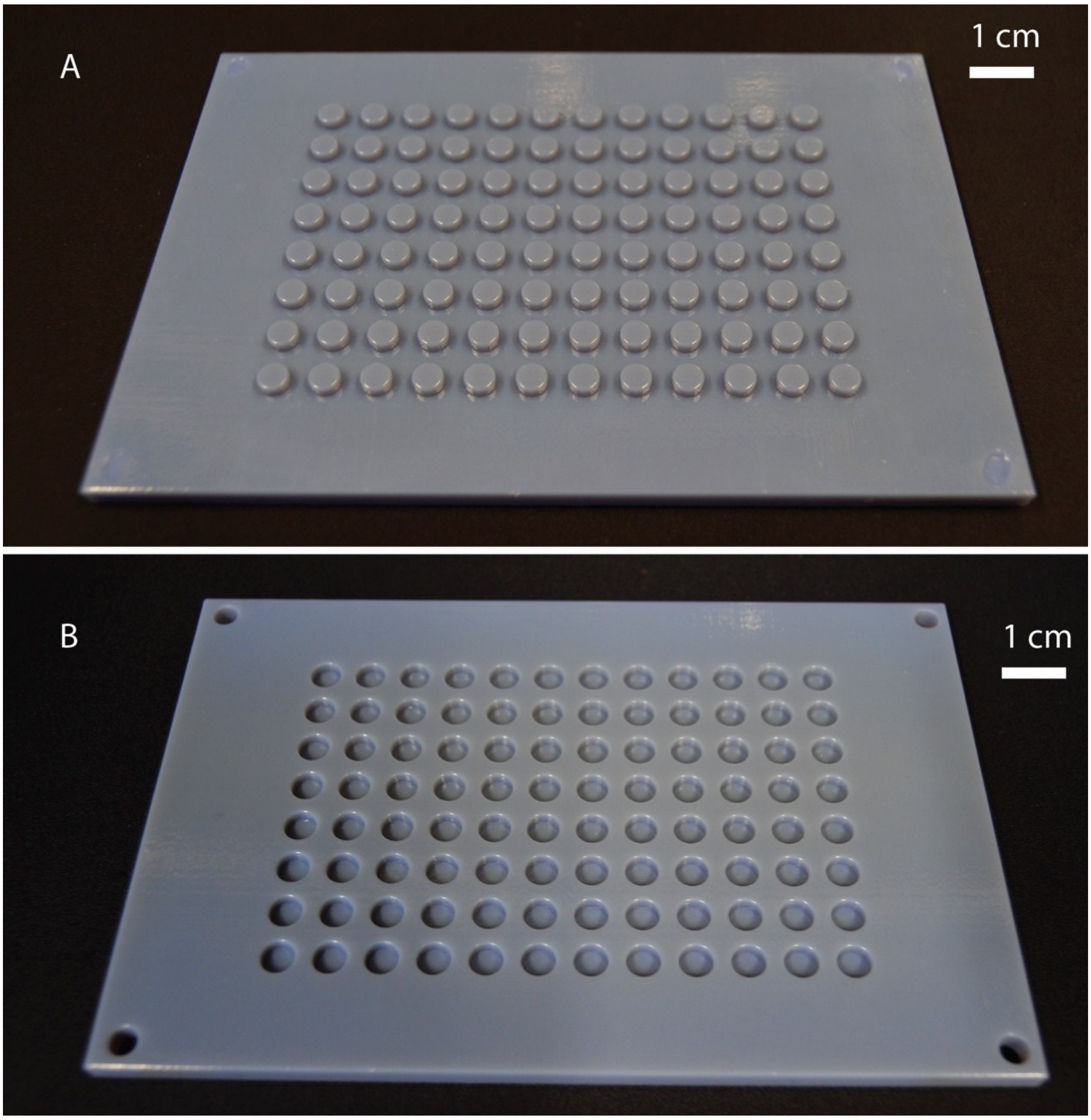


**Figure S3.** Photographs of molds, fabricated in polyurethane using 3D printing, used for the fabrication of microplates.

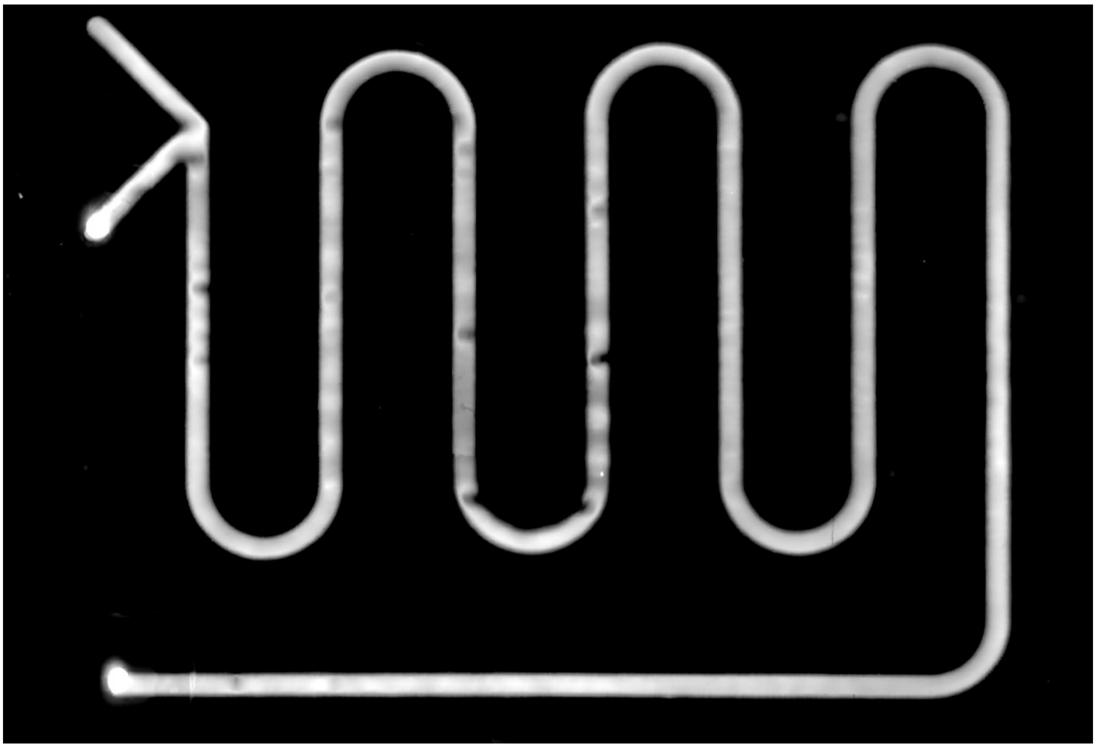

**Figure S4.** Fluorescence image of a solution (fluorescein 0.001 wt/v % in water) injected into the channels of a nitrocellulose-coated cellophane ($C^{NS}$) microfluidic device. A Typhoon FLA 9000 instrument was used to image the devices, with a 494 nm emission laser, a filter for 521 nm emission, and an image resolution 40 µm/pixel. The dark spots correspond to bubbles or buckled channels.

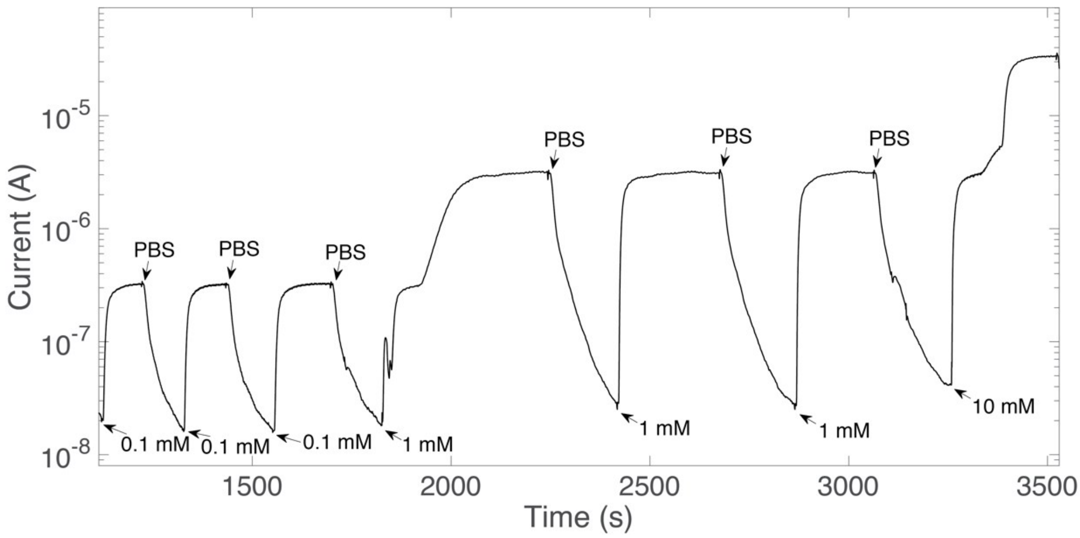


**Figure S5.** Time-current response of a continuous flow experiment, with an electroanalytical device as in Figure 7. The data were obtained by potentiostatic amperometry (+0.4 V) for potassium ferrocyanide. The ferrocyanide (in phosphate-buffered saline 1xPBS, pH 7.0) was injected from the sample inlet at different concentrations (0.1 mM, 1 mM and 10 mM) at a constant flow rate of 50 µL/min. A buffer solution (1xPBS) was pumped at 50 µL/min between each injected sample solution (the sample was not pumped when the buffer was running), to acquire a baseline current for normalization.

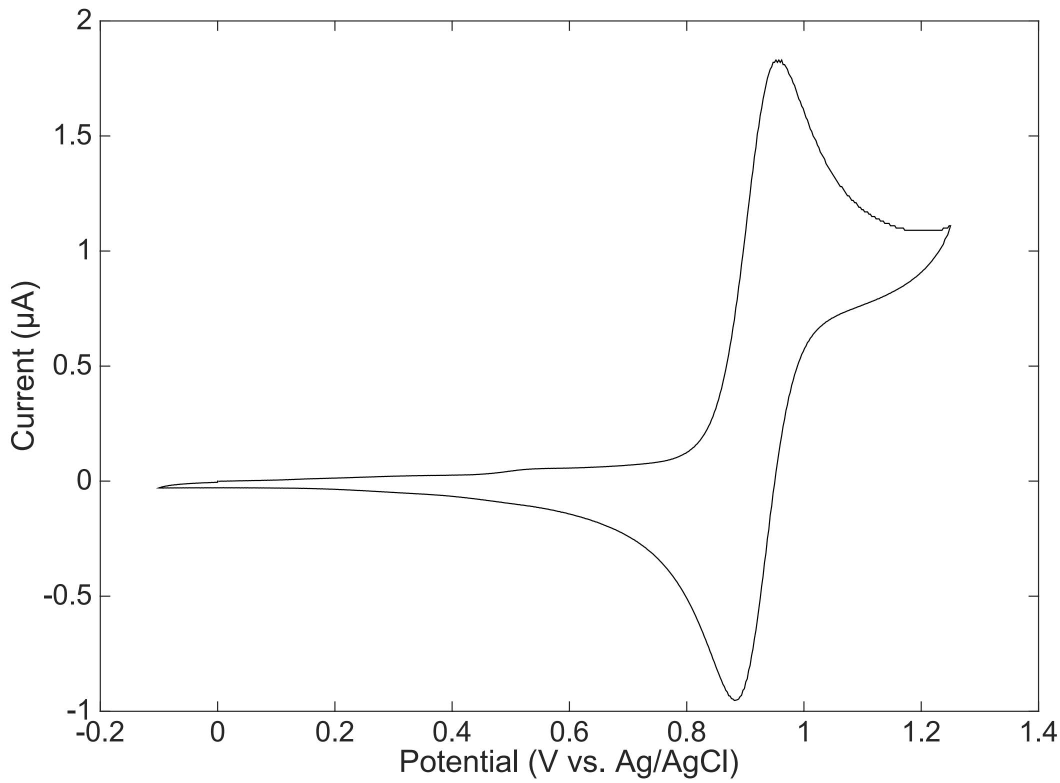


**Figure S6.** Cyclic voltammograms of $Ru(bpy)_3^{2+}$ (1mM in 1xPBS) measured at 100 mV/s, using a microfluidic device similar to that seen in Figure 7E.

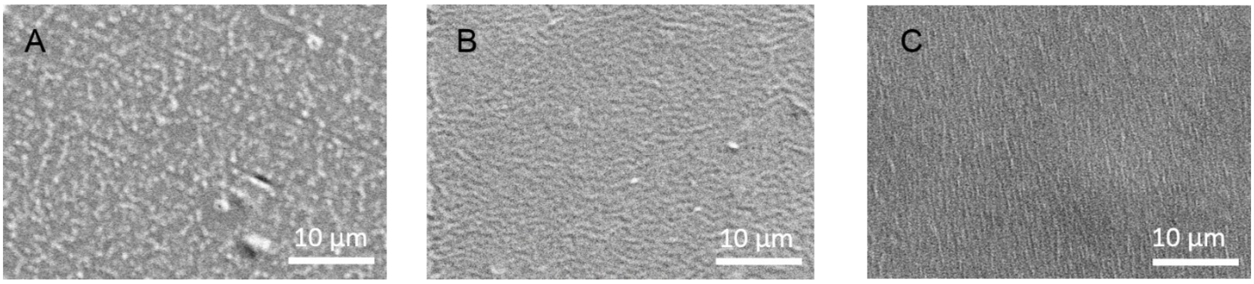


**Figure S7**. SEM images for A) cellophane $C^{OH}$ , B) nitrocellulose coated cellophane $C^{NC}$, C) PVC coated cellophane $C^{PVC}$. A 10 nm Pt/Pd coating was deposited on the surface of all the cellophane sheets for SEM imaging.