

## Supplementary Information

### Realizing New Designs of Multiplexed Electrode Chips by 3-D Printed Masks

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	a)	b)	c)	d)
Xstal Start:	92.67	96.55	92.53	89.71
Xstal End:	91.61	95.18	91.88	88.48
Pressure start (Torr)	$4.6 \times 10^{-7}$	$2.0 \times 10^{-7}$	$5.0 \times 10^{-7}$	$4.0 \times 10^{-7}$
Pressure final (Torr)	$5.0 \times 10^{-7}/2.0 \times 10^{-6}$	$2.5 \times 10^{-7}/1.0 \times 10^{-6}$	$1.5 \times 10^{-6}/2.0 \times 10^{-6}$	$4.0 \times 10^{-7}/1.1 \times 10^{-6}$
Pressure max (Torr)	$1.3 \times 10^{-7}/3.0 \times 10^{-6}$	$9.0 \times 10^{-7}/1.1 \times 10^{-6}$	$5.0 \times 10^{-7}/1.1 \times 10^{-6}$	$2.0 \times 10^{-7}/1.2 \times 10^{-6}$
Adhesive Material	Cr	Ti	Ti	Ti
Adhesive Thickness (Å)	50	50	50	50
Adhesive Rate (Å/s)	1.0	1.0	1.0	1.0
Adhesive Current (I)	0.04	0.04	0.04	0.04
Au Thickness (Å)	1000	781	500	1000
Au Rate (Å/s)	1.5	1.5	1.0	1.0
Au Current (I)	0.03	0.08	0.04	0.04
Au Start (g)	16.22	12.73	12.64	13.30
Au Final (g)	15.81	12.25	12.50	12.82

**Table S1.** Additional details for table 1. Conditions for physical vapour deposition (PVD) at Nanofabrication Kingston (NFK).

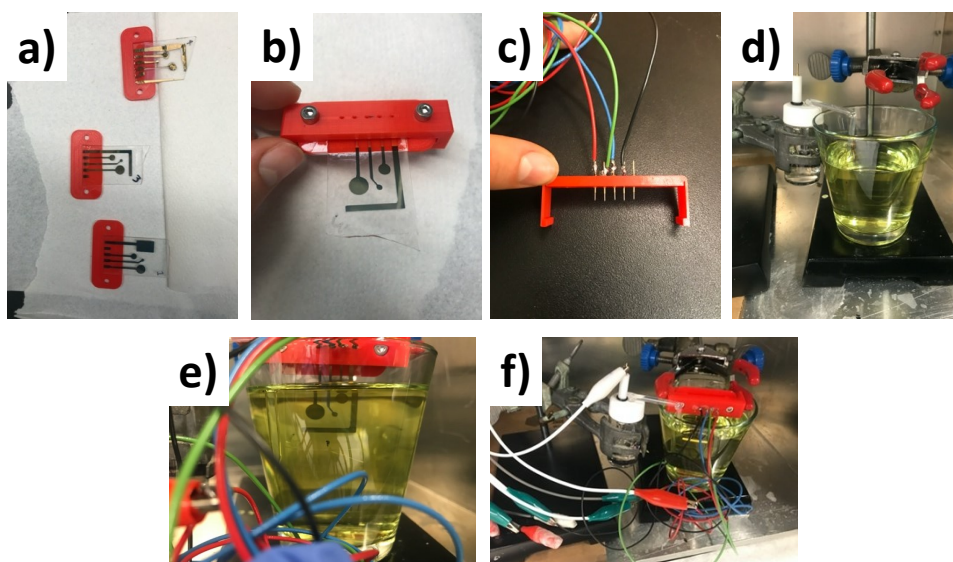
#### Chip Reader Fabrication

##### Details of Pogo Pins (P50-B1 - 16mm)

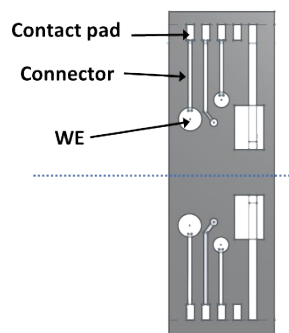
Pin Centre: 0.68mm, Min test distance: 1.27 mm, Spring Pressure: 75 g, Full Stroke: 2.65 mm, Current Rating: 3 A, Current Resistance: 50 mΩ, Plunger: Heat Treated Beryllium Copper, Barrel: Phosphor Bronze. Gold Plated, Spring: stainless steel.

##### 3D printing Parameters

0.1 mm, 95% fill density, PLA



**Fig. S1.** Illustration of assembly of the system for electrochemical measurements. a) Attaching red chip tab to glass chip with super glue. b) Securing the chip tab into the chip housing with screws. c) Multiple pogo pins on a holder with connection wires. d) Setting up the reference electrode with a salt bridge to the electrolyte solution. e) Immersing the electrodes on the chip in the electrolyte solution. f) Connecting the wires on the chip reader to the potentiostat.



**Fig. S2.** Illustration of contact pad, connector and working electrode in the design. Contact pads are used for connecting to the instrument via chip reader (Fig. S1, red part.). Connectors were coated to control the exposed surface area of working electrodes (WEs).