SI figure 1-

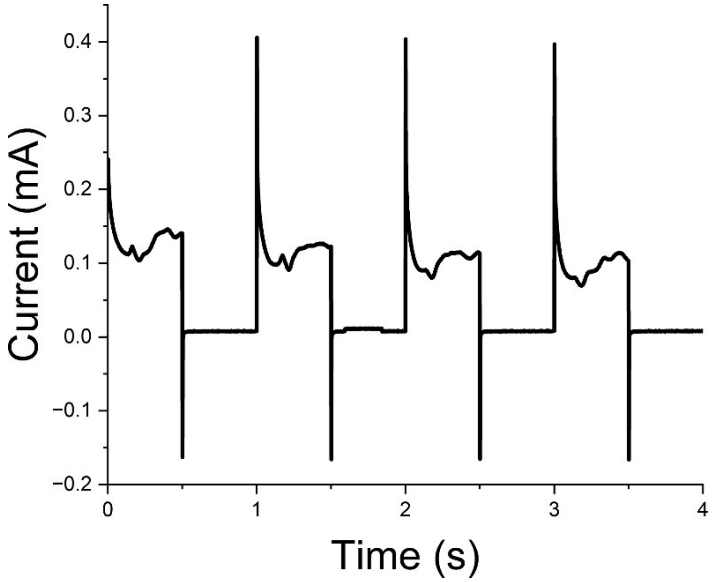

Figure S1: Current vs. time trace for electrodeposition of gold nanoring on an indium tin oxide (ITO) electrode using 4 cycles of stepping potential from -0.65 V for 0.5 s to 0.3 V for 0.5 s. Positive current indicates reducing current and vice versa.

SI figure 2-

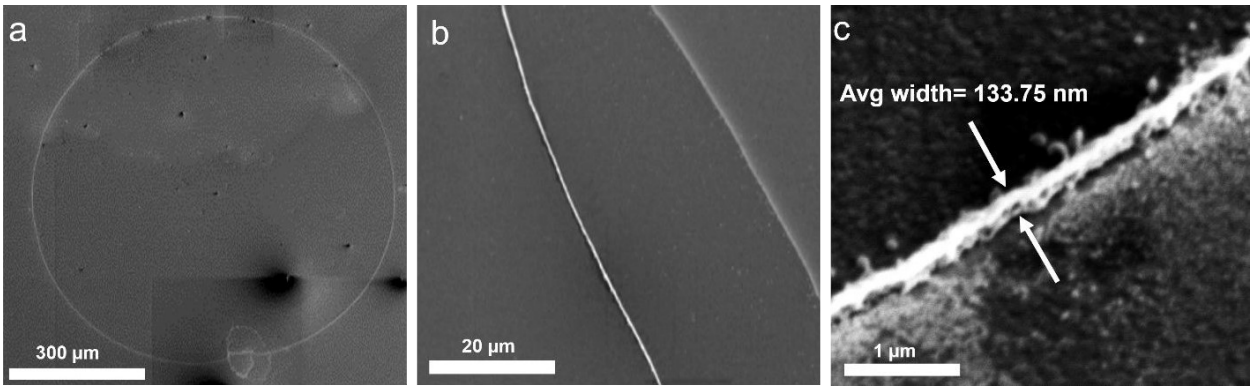

Figure S2: Scanning electron microscopy (SEM) images of the gold nanoring on indium tin oxide (ITO) electrode imaged at (a) 300 µm, (b) 20 µm and (c) 1 µm. The measured width at the marked location in (c) was ~ 133.75 nm.

SI figure 3-

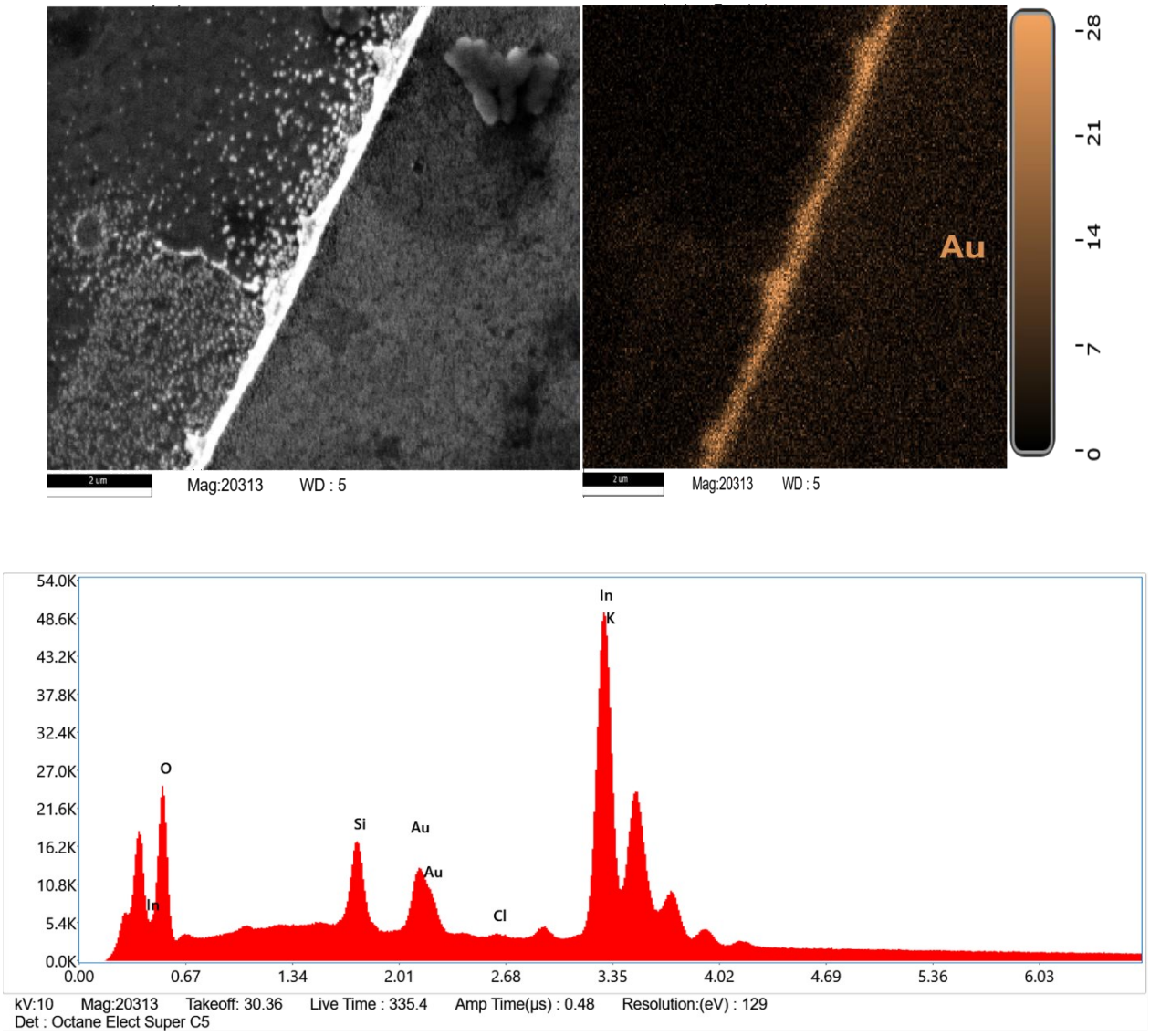

Figure S3: Scanning electron microscopy (SEM) image (top-left) and energy-dispersive X-ray (EDX) image (top-right) shows the area where the gold was preferentially electrodeposited. The energy-dispersive X-ray (EDX) spectrum (bottom) validates the presence of gold and other elements like indium, tin, oxygen and silicon from the indium tin oxide (ITO) glass electrode that was used. The deposition of gold was achieved by applying -0.65 V (vs Ag|AgCl) for 0.5 s and stepped to 0.3 V (vs Ag|AgCl) for 0.5 s and cycled for 4 cycles on an ITO electrode.

SI Table 1-

Element	Weight %	MDL	Atomic %	Error %	Net Int.	R	A	F
O K	16.56	0.1	56.77	10.60	435.26	0.7600	0.1602	1.0000
Si K	2.57	0.04	5.03	5.73	315.64	0.8079	0.7067	1.0109
Cl K	0.31	0.06	0.48	13.44	24.05	0.8326	0.8578	1.0284
K K	0.79	0.3	1.11	10.45	44.03	0.8511	0.9152	1.0388
In L	72.24	0.21	34.52	3.71	1566.11	0.8567	0.9153	1.0047
Au M	7.53	0.14	2.10	5.76	244.80	0.8241	0.8195	1.0161

Table S1: Elemental Analysis from the EDX Spectrum shown in Fig. S3.

SI figure 4-

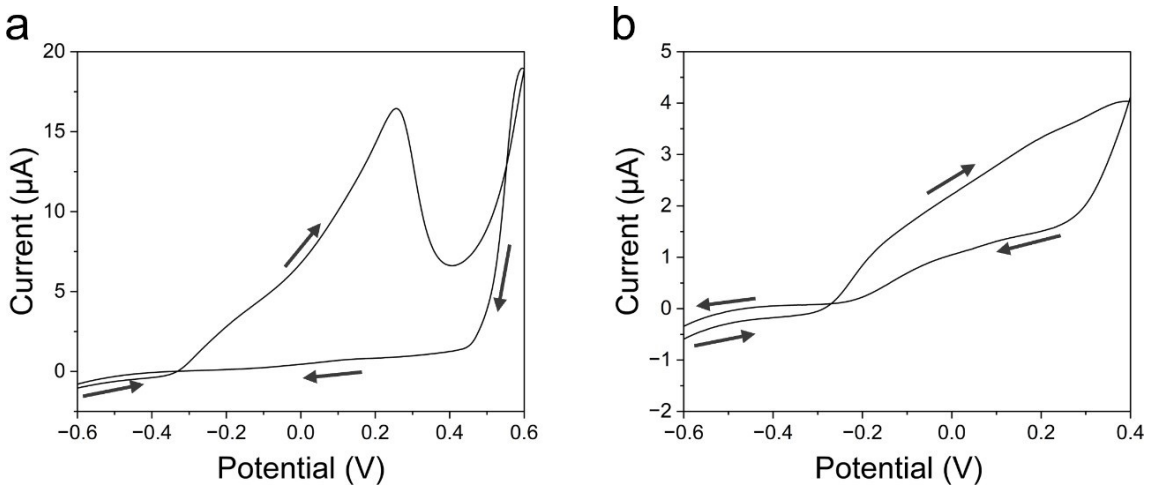

Figure S4: First sweep of cyclic voltammograms of 10 mM hydrazine in 0.25 M KOH on CHI 6284E potentiostat on scanning from -0.6 V to 0.6 V at a scan rate of 50 mVs^{-1}. A salt bridge connected to a Ag|AgCl reference electrode was used as counter electrode and thin glassy carbon rod was used as a counter electrode. Black directional arrows indicate scan direction.

SI figure 5-

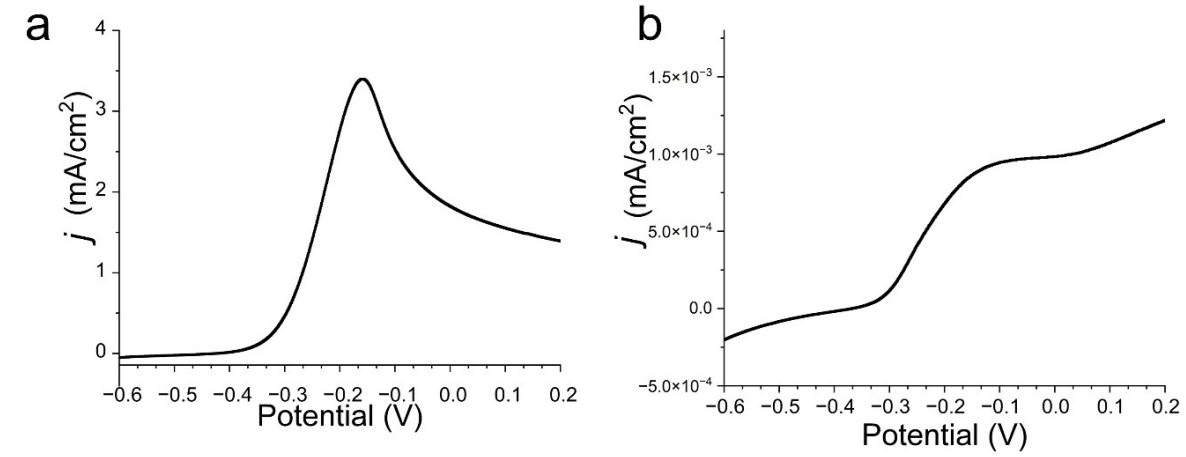

Figure S5: Area-normalized cyclic voltammograms for hydrazine oxidation, corresponding to data in Figure 2, measured vs. Ag|AgCl (3 M KCl) in 10 mM hydrazine and 250 mM KOH at 50 mV s^{-1}, scanned from −0.7 V to 0.6 V, shown up to 0.2 V for clarity. (a) Macroelectrode current density profile. (b) Ring electrode current density profile.

SI figure 6

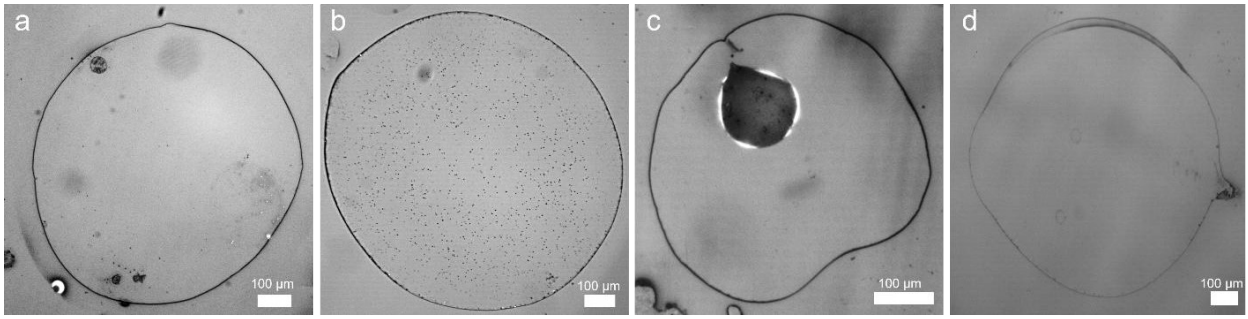

Figure S6: Light microscopy images of replicated gold nanoring electrodeposited on indium tin oxide (ITO) substrate using the system where a droplet of 10 mM $HAuCl_4$ in 1,2-dichloroethane (DCE) solution containing 100 mM tetrabutylammonium perchlorate ($[NBu_4][ClO_4]$) was pipetted on an ITO surface enclosed in an epoxy cell containing 1 M KCl solution. The deposition of gold was achieved by applying -0.65 V (vs Ag|AgCl) for 0.5 s and stepped to 0.3 V (vs Ag|AgCl) for 0.5 s and cycled for 4 cycles on an ITO electrode. Some rings show gold particles deposited within which may happen due to improper cleaning of ITO surface prior to the electrodeposition. (Note: Some rings show gold particles deposited within which may happen due to improper cleaning of ITO surface prior to the electrodeposition.)