Supporting Information

Bipolar Clark-type oxygen electrode arrays for imaging and multiplexed measurements of the respiratory activity of cells

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Device fabrication. The devices were fabricated using a thin-film process. First, a glass wafer was cleaned using a boiled aqueous solution prepared by mixing 25 wt% ammonia solution, 30 wt% hydrogen peroxide solution (H_2O_2), and pure water in a 1:1:4 ratio. After rinsing in boiled pure water, the wafers were dried using nitrogen gas. Positive photoresist (S-1818G) patterns for lift-off were then formed on a glass wafer by projecting UV light through a photomask onto the photoresist layer, developing the photoresist, and rinsing and drying the wafer. A 50-μm thick chromium layer and a 150-μm thick platinum layer were then deposited on the wafer by sputtering. Residues of the metals on the photoresist were removed using acetone. After cleaning the wafer and forming photoresist patterns, a 200-μm thick silver layer was deposited to form the driving electrode of the cathodic compartment. To form the insulating layer for the leads, polyimide (SP-341) patterns were formed using the positive photoresist by projecting UV light through a photomask onto the photoresist layer, developing the photoresist, dissolving exposed polyimide parts using the developer, and rinsing and drying the wafer. The polyimide at the photoresist patterns' exposed areas was removed simultaneously during the development of the photoresist. The polyimide was cured for 15 min at a final temperature of 280 °C. Negative photoresist (SU-8 25) patterns were formed similarly to the positive photoresist to form solution reservoirs. The wafer was cut into 20 mm × 35 mm chips using a dicing machine. The chips were then immersed in a solution containing 50 mM KOH and 30 wt% H_2O_2 for 10 min to clean the electrode surface before each measurement.

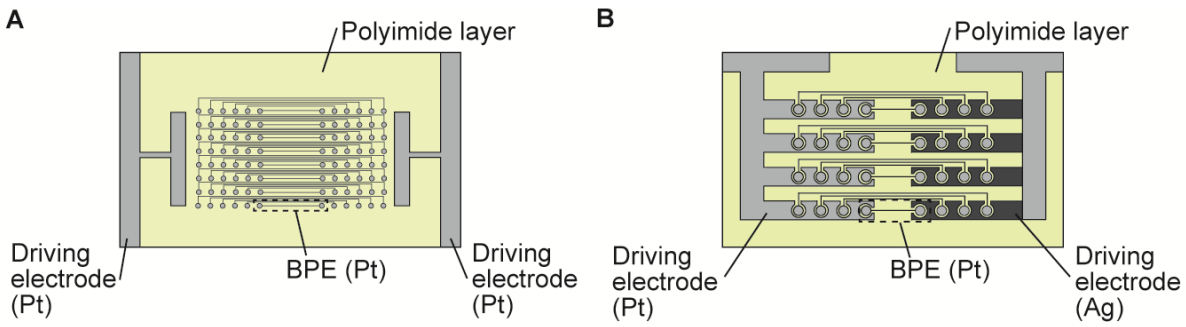

Figure S1. Electrode layouts on a glass substrate of the type I (A) and type II (B) devices.

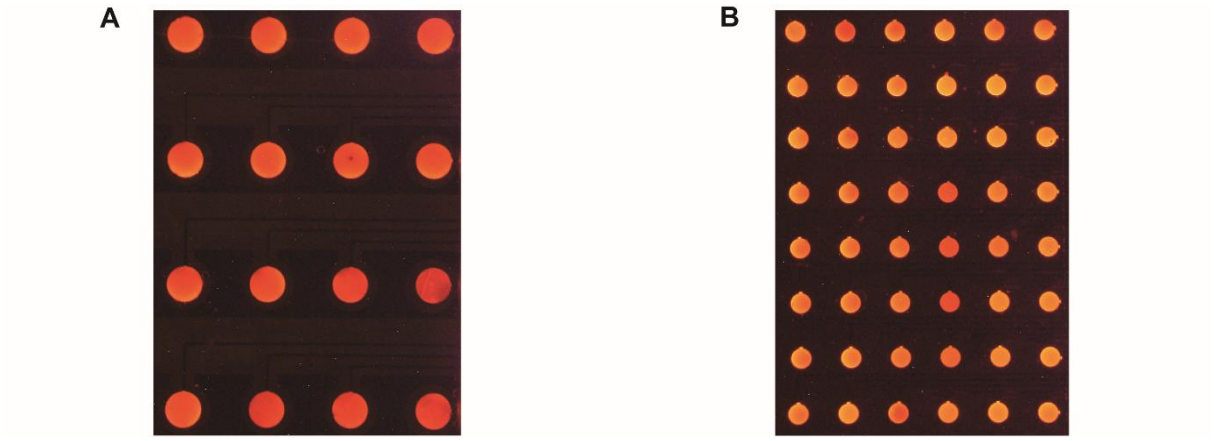

Figure S2. ECL observed from the anodes of the type II (A) and type I (B) devices. For both, the PMMA chambers on the cathode side were filled with pure water saturated with air.