

Power generating contact lenses from tear biofluids

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Using tear to generate power is an important challenge for wearable smart contact lenses. Conventional power generation from tear biofluids such as using glucose or lactic acid was constantly improving, but it still has the problem of insufficient output power. Here, we present a power generating contact lens with biocatalysts (enzymes: glucose oxidase (GOD) or lactate oxidase (LOD)) and Zn catalyst for a hybrid anode and a bilirubin oxidase (BOD) biocatalyst for a biocathode. The anodes and the cathodes were fabricated by our previous methods [1-3]. The biofuel cell (GOD or LOD anode/BOD cathode) generated a output power of $8.8\mu\text{W}$ at 0.3V , while the primary metal cell (Zn anode/BOD cathode) was $20.8\mu\text{W}$ at 0.64V . When we combined the biofuel cell with the primary cell, the performance of hybrid cells enhanced to $32.5\mu\text{W}$ at 0.47V in tear fluid.

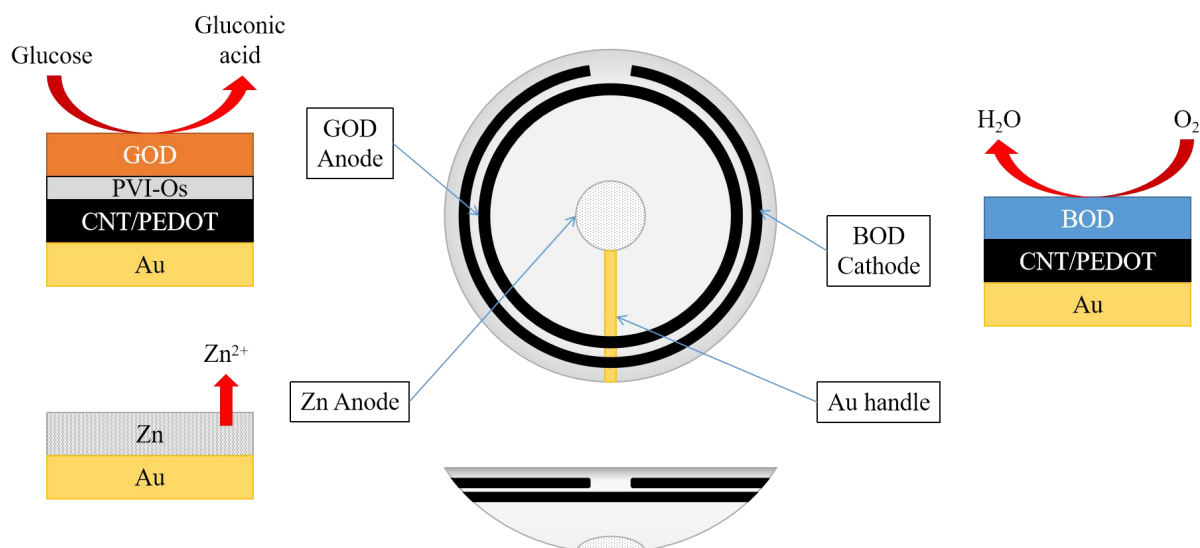


Fig.1 A power generating contact lens from tear biofluids.

Reference:

1. Yin S, et al. Biosensors and Bioelectronics, 141, 111471, 2019.
2. Yin S, et al. Biosensors and Bioelectronics, 165, 112287, 2020.
3. Taiki T, et al, Advanced Functionl Materials, 30, 1906225, 2020.