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Scientists Develop Tear-Fluid-Charged Battery for Smart Contact Lenses

By **Howard Rhodes**

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Scientists at Nanyang Technological University in Singapore have made progress in solving one of the challenges faced in the development of “smart” contact lenses – how to power them safely and discreetly. Most current devices either use metal electrodes, which can be harmful if exposed to the eye, or require a metal coil to transmit power. The team has proposed an alternative solution – a 0.5-mm-thin battery integrated into the lens that is powered by tear fluid.

The lens-integrated battery contains water and a coating of an enzyme called glucose oxidase. When the battery is immersed in the tear fluid on the eye, the enzyme reacts with sodium and chloride ions in the fluid, generating an electrical charge within the water. In lab tests, the battery produced a current of 45 microamperes and a maximum power of 201 microwatts, sufficient to wirelessly transmit data from a smart contact lens for at least 12 hours.

The battery lasts for approximately 200 charge/discharge cycles and can be recharged overnight by placing it in a saline solution for at least eight hours. This tear-fluid-charged battery offers a promising solution for powering smart contact lenses without the need for external power sources or potentially harmful metal electrodes.

The development of this tear-fluid-charged battery brings us closer to practical and safe smart contact lenses. As advancements in the field continue, these lenses have the potential to revolutionize the way we monitor eye health, deliver medication, and even enhance our vision with augmented-reality imagery.

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