

AUGMENTING BIOHYBRID CHEMICAL SENSOR PERFORMANCE THROUGH NANO- NEUROMODULATION

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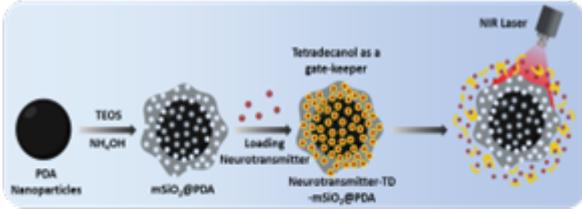
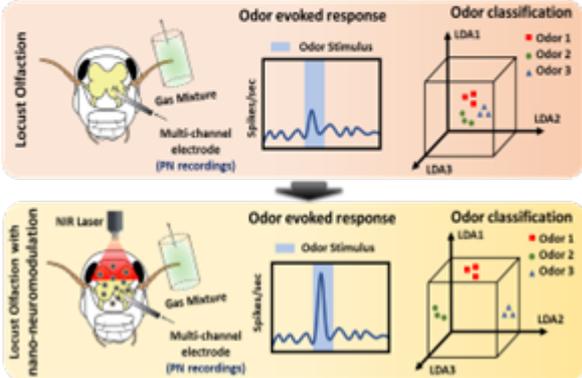
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Value Proposition: *Novel process that can improve the sensitivity and specificity of biohybrid chemical sensors.*

Technology Description

Researchers at Washington University in St. Louis have developed a chemically enhanced nanoparticle structure that can react to light & temperature which can release neurotransmitters in the animal that is implemented, alongside an electrode probe that can monitor the response. Biological olfactory systems are highly sensitive and selective and often outperform engineered chemical sensing devices in highly complex and dynamic environments. Current approaches to read-out information from biological systems, especially neural signals, tend to be sub-optimal due to the number of electrodes that can be used and where they can be placed.

This invention successfully engineered cybernetic enhancements to the common locust, with superior odor recognition performance relative to their control counterparts. The nanoparticle can successfully increase the quantity of neurotransmitters released, enhancing the brain activity of locusts and robustly enhancing their ability to detect a variety of test chemicals.

(A) NIR laser induced photothermally triggered neurotransmitter delivery nano-vehicle

(B) Augmentation of Locust olfaction via nano-neuromodulation


Stage of Research

Preliminary proof of concept

Publications

Gupta P, Chandak R, Debnath A, Traner M, Watson BM, Huang H, Derami HG, Baldi H, Chakrabarty S, Raman B, Singamaneni S. Augmenting insect olfaction performance through nano-neuromodulation. *Nat Nanotechnol.* 2024 May;19(5):677-687. doi: 10.1038/s41565-023-01592-z. Epub 2024 Jan 25. PMID: 38272973.

Applications

- Chemical sensing

Key Advantages

- Fast and scalable, improving odor identification
- Capable of flight

Patents

Patent application filed

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