Flexible microelectrodes for acute recording in non-human primates

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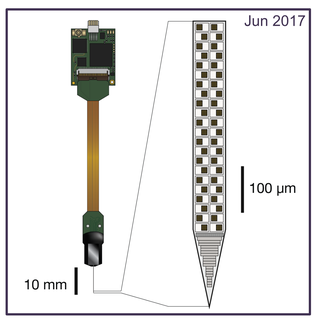
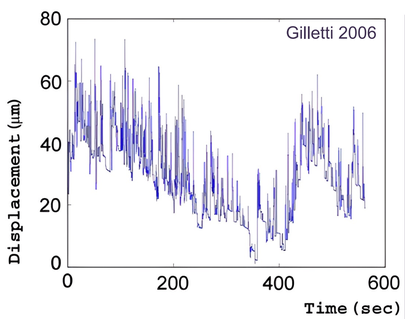
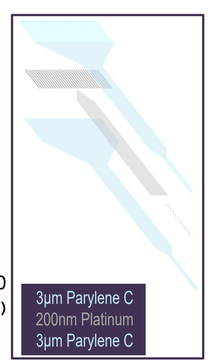
Introduction & Background



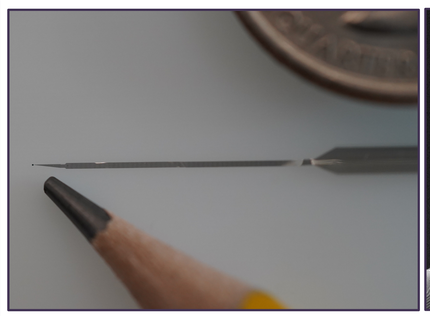


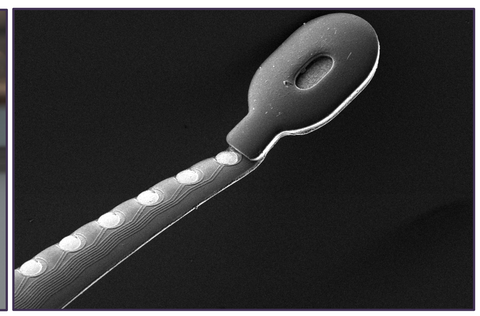


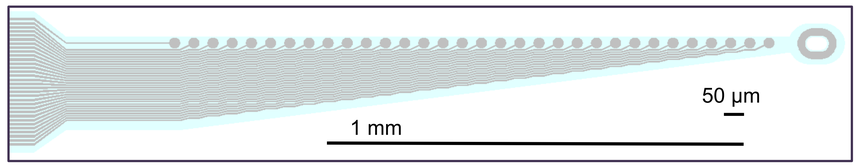
State-of-the-art, high-density penetrating electrodes enable probing of neural circuitry. However, their stiffness fails to accommodate the brain's natural oscillations caused by respiration and cardiac rhythm.

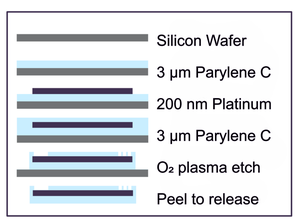
Solution: Flexible, transparent electrode array that allows for stable recordings despite brain micromotions, minimizing signal loss and surrounding tissue damage

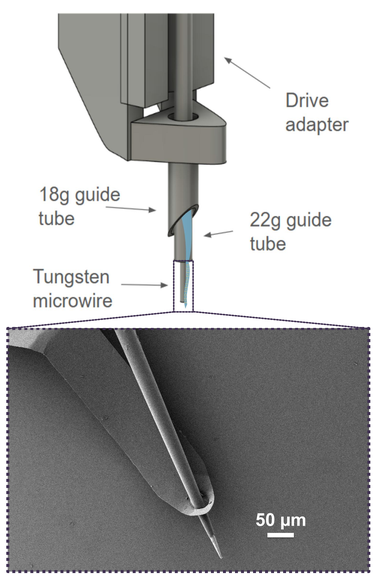
Probe Design and Insertion Method

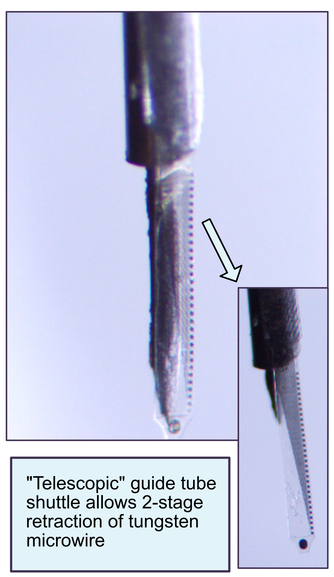






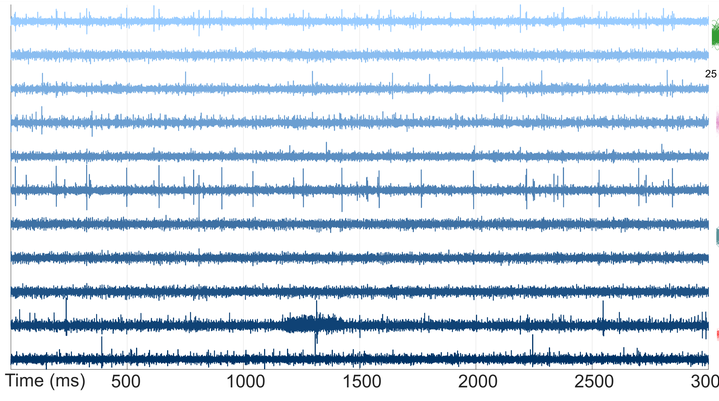


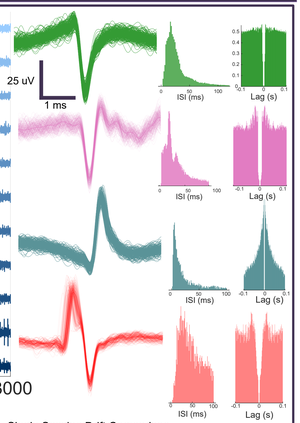


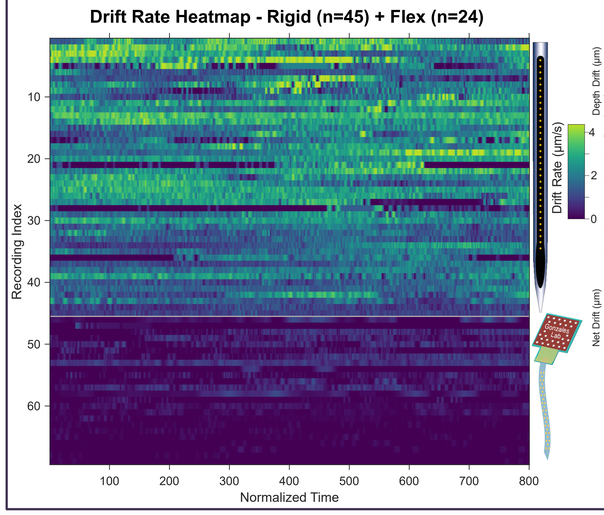


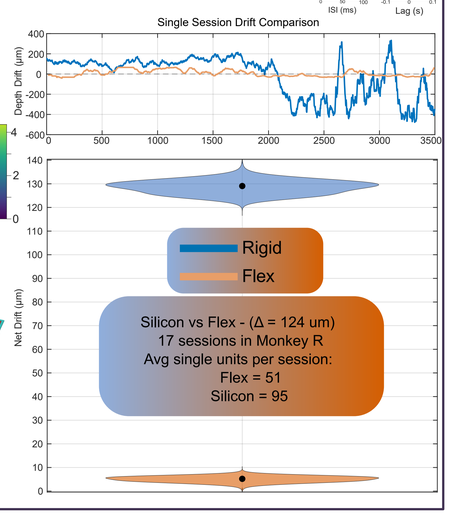
"Telescopic" guide tube shuttle allows 2-stage retraction of tungsten microwire

Low-Drift, Single Unit Recordings



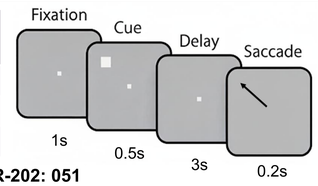


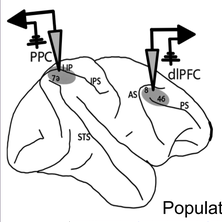


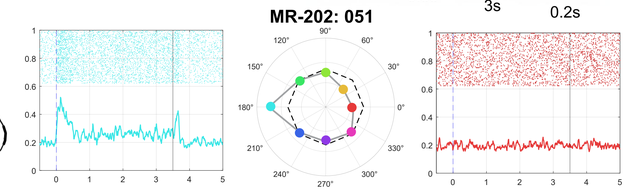


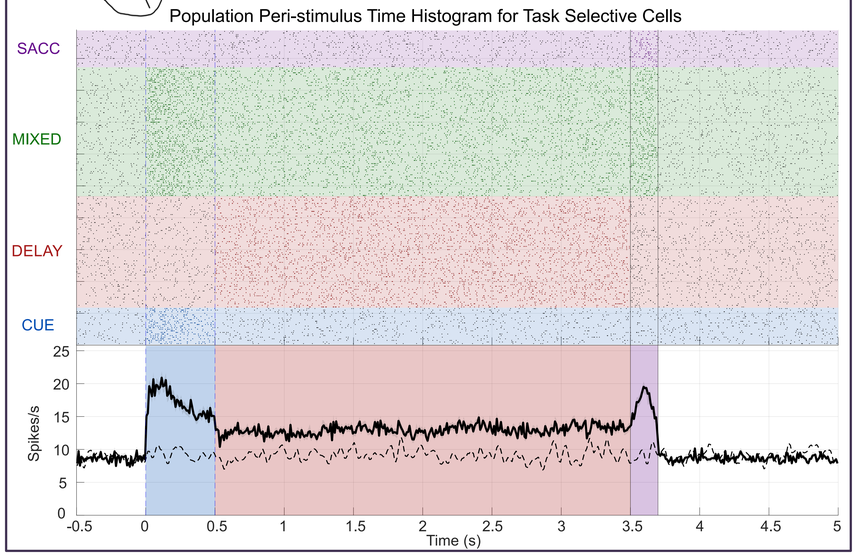
Recording During Working Memory Task

Subject	Sessions	PFC Neurons	PPC Neurons	Total
MO	5	48	n/a	48
MR	13	86	98	184
Total	18	134	98	232





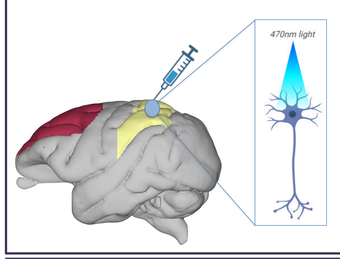


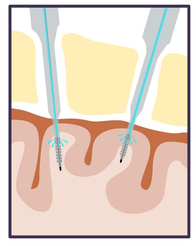


Conclusion & Future Directions

Leveraging nanoscale fabrication of platinum deposition onto Parylene-C results in a robust, flexible electrode capable of recording single units in cortex, while maintaining optical transparency, and can be reliable shuttled into tissue with minimal damage and high mechanical stability.

Future directions include leveraging thin film probes for multi-device insertion, scaling to higher channel counts, and integrating with transparent conductors for a novel optoelectronic device suitable for chronic applications.





Acknowledgments

This work is funded by the Vanderbilt Brain Institute, HHMI Hanna Gray Fellowship, and the Burroughs Wellcome Fund. All samples were fabricated using facilities in the Vanderbilt Institute of Nanoscale Science and Engineering, with assistance from Owen Meilander. We thank Jaela Bills for assistance with experiments and data collection.