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Neurophysiology Probes

Application

- Driver: Sensing activity of large numbers of neurons in mouse and rat brains to understand basic brain function.
- Market Size: 500-1000 research groups world wide, ~\$50-150K per group per year annual spending in the area. Substantial long term overlap with human clinical brain implants.
- Need: Monitoring activity of individual neurons is a common and basic part of neurobiology research. Current devices compatible with mice and rats have at most 64 sensing sites. Systems with thousands of sites are needed.

Advantages

- Far more complete data sets resolving current ambiguities of active neuron count
- Ability to monitor multiple brain regions at the same time
- Resolution of closely spaced neurons

Research Needs

Scientific/technological problems and barriers:

- Brain immersed high sensor site "shanks" with multiplexing and amplification on shank and/or multilayer metallization with just above brain programmable multiplexing
- Very light weight head mounted multiplexing and amplifying electronics

Metric(s) of Progress

Year 3

- Integrated single shank devices with 500-1000 addressable sites per shank.
- Head mounted electronics to multiplex up to 5000 signals

Year 5

- Project completion
- 5 probes, 10 shanks each, 500-1000 sensor sites per shank

Resource requirements: ~\$1-1.5M/yr, 3 FTE plus Si IC fabrication cost through several cycles of design and test