Implantable 64-Channel Microsystem for the Recording of Biopotentials from Motor Cortex of the Brain

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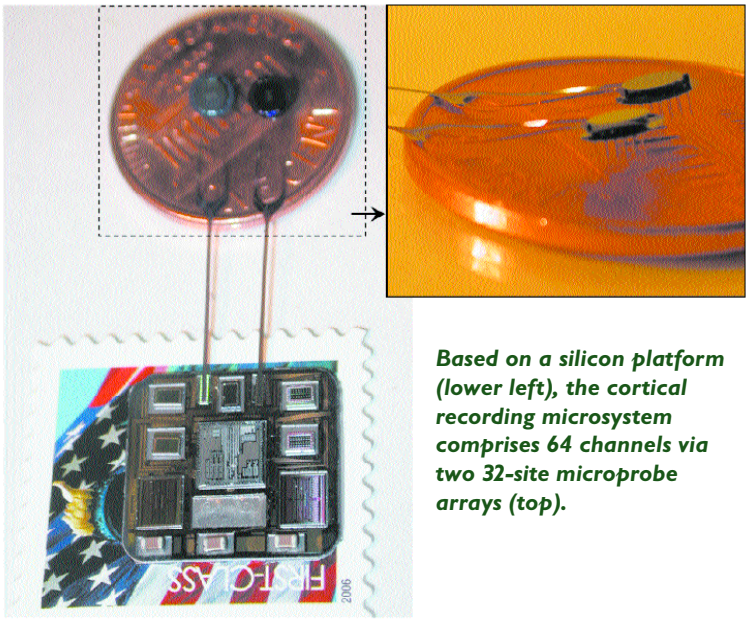
Direct recording of action potentials from different regions in the brain offers great promise to physicians and neurophysiologists trying to better understand brain behavior. Such recording should help reveal the mechanisms of brain disorders so remedies can be found.

This research highlight deals with an implantable neural microsystem that records from 64 sites on the motor cortex. The system includes: two micro-assembled, 32-site passive microprobes with miniaturized ribbon cables; one signal conditioning front-end; two neural processors; and one bidirectional telemetry chip. All components are assembled on a silicon platform, as shown at the right.

The system has two operational modes: Scan and Monitor. In the Scan Mode, all channels are searched for the occurrence of neural spikes. The addresses of the active channels are sorted, packed, and sent to the outside world through the reverse telemetry link. In this mode, each channel can be individually set up to detect positive, negative, or biphasic spikes. Also, the spike detection thresholds can be adjusted for each one of the channels individually. In the Monitor Mode, any of the 64 neural channels can be sent out directly in analog form or after quantization to 8 bits.



Based on a silicon platform (lower left), the cortical recording microsystem comprises 64 channels via two 32-site microprobe arrays (top).