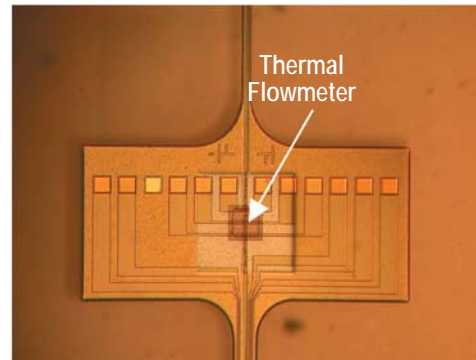
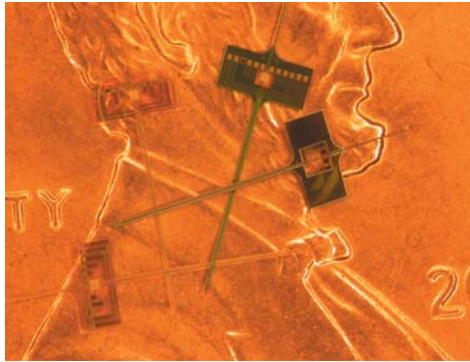


## A Chemical-Mechanical-Polishing/Trench-Refill-Based Drug-Delivery Probe with In-Line Flow Measurement

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A new drug-delivery probe based on chemical-mechanical-polishing (CMP) and trench-refill techniques has been designed and fabricated as part of the ERC's efforts to develop implantable neural microsystems. With these new techniques, the dimensions of the channel cross-section can be reduced to less than  $50\mu\text{m}^2$  and channel formation yield is improved to above 90%. Probes made of dielectrics and silicon in combination or pure dielectrics have been fabricated along with integrated electrical recording sites for monitoring cellular activity as a function of drug dose. Testing has established the robustness of these new structures for *in-vivo* applications. In-line thermal flowmeters have been integrated into the probes surrounded by a dielectric thermal-isolation structure that is expected to improve thermal efficiency by at least 20% compared with earlier devices. Together with the reduced channel cross-section, flow resolutions as low as 200pL/sec are expected.



**Dielectric-Silicon and all-dielectric drug-delivery probes fabricated using a new CMP/trench-refill process and containing in-line flowmeters.**