A Low-Rise 3-D Cortical Interface

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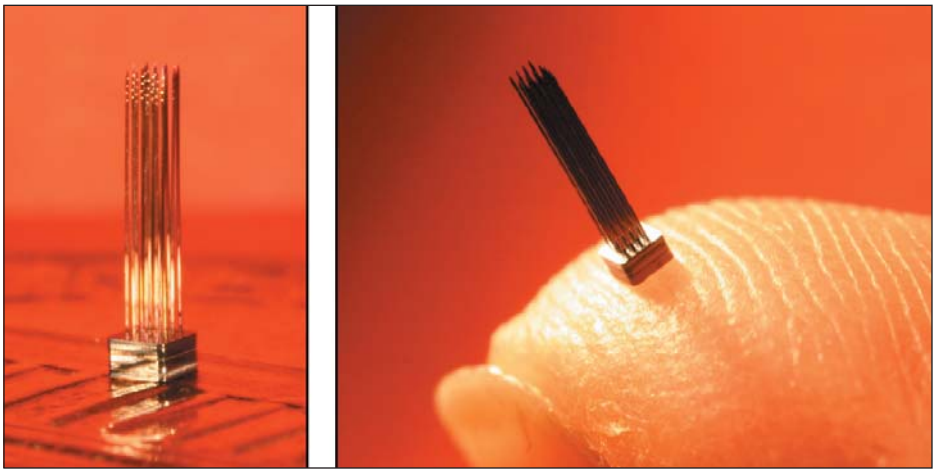

Past work has produced 3-D electrode arrays using microassembled planar 2-D probes, but the arrays have been tedious to assemble using micromachined spacers, limiting their availability for practical use. Also, they have had relatively high rise above the cortical surface and have consumed a wide footprint there due to the use of lead transfer wings on the probes. A new 3-D probe structure has been developed that overcomes these problems, resulting in a low-rise (100–500μm) structure that allows the dura to be replaced over the implant and that occupies barely more area on the surface than the array itself. Assembly is simplified by eliminating the wings and spacers, embedding the arrays in a solid block. The approach also permits simple high-density interconnects to a hybrid circuit chip that provides signal selection, amplification, and buffering. A four-probe prototype array is shown, consisting of 64 sites on 200μm centers in three dimensions with 16 40μm-wide, 4mm-long shanks. The interface is shown with the 1mm x 1mm x 0.5mm base resting on a penny and on a fingertip. ■