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Development of Easier and Inexpensive Method for Flexible Multichannel Neural Electrodes

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This paper describes an easier and cheaper method for fabricating flexible multichannel neural electrodes based on photosensitive material by using microelectromechanical systems technologies. A conventional micromachining with non-photosensitive materials such as Poly (para) xylylene (Parylene) or non-photosensitive polyimide includes a dry etching process. The dry etching process requires expensive machinery and maintenance and involves complex multilevel processes for controlling etching conditions to define the outline of the neural electrodes and to expose the microelectrodes for detecting neural signals. Our method applying photosensitive material eliminates these costly and complex processes. This means that more options are allowed for optimizing the configuration and size of neural electrodes depending on experimental purposes, and electrodes could be fabricated at a lower cost with improved process yields. In this study, we used photosensitive polyimide, and we designed and fabricated two types of flexible neural electrodes for recording an electrocorticogram or intracortical action potentials. The fabricated neural electrodes had physical properties (such as size and impedance) that were satisfactory for neural recordings. It was confirmed that the fabricated neural electrodes permit the successful recording of neural signals from rat cerebral cortex.

(3, 2) –Track Layout of Bipartite Graph Subdivisions

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A (3, 2)–*track layout* of a graph G consists of a 2-*track assignment* of G and an edge 3-coloring of G with no monochromatic *X-crossing*. This paper studies the problem of (3, 2)–track layout of bipartite graph subdivisions. Recently Dujmović and Wood have shown that every graph G with n vertices has a (3, 2)–track subdivision of G with $4\lceil \log qn(G) \rceil+3$ division vertices per edge, where $qn(G)$ is the queue number of G. This paper improves upon their result for the case of complete bipartite graphs and shows that every complete bipartite graph $K_{m,n}$ has a (3, 2)–track subdivision of $K_{m,n}$ with $2\lceil \log qn(K_{m,n}) \rceil+1$ division vertices per edge, where m and n are the numbers of vertices of the partite sets of $K_{m,n}$ with $m \geq n$.