

Bioelectronic interfaces based on one-dimensional nanomaterials

REU mentor: Alex Noy. A number of recent advances in microelectronics and nanoscience have opened up the possibility of constructing bioelectronic interfaces that connect biological activity to electronic circuits on the level of individual proteins. Our group at the Lawrence Livermore National Laboratory is working on developing such interfaces using one-dimensional nanoscale materials, such as carbon nanotubes and silicon nanowires. Small size and excellent electronic properties of 1-D nanomaterials allow direct integration of biological components into nanoelectronic circuits and we have already developed devices that combine nanowire architectures with functional biological ion channels, pumps and membrane-bound performance-modifiers that enable electronic coupling of membrane transport. REU students will work with graduate students and postdocs on this multi-disciplinary project and participate in fabrication of these bioelectronic devices, incorporation of biological molecules into them, and on using these devices to record biological activity.

