

EXECUTIVE SUMMARY: (State in layman's terms the application's broad, long-term objectives and specific aims, making reference to the potential public benefits of the project for California.)

Nanotechnology promises advances in sensors for toxins and pollutants, 'smart materials' and faster computers. This project focuses on a component of nanotechnology known as the DNA nanoswitch. Just as a computer keyboard or bank of switches on a machine allow people to control aspects of a device or many devices, these DNA nanoswitches provide unprecedented control over *molecular* devices.

My lab's overarching goal is to harness the power of *bioorganic chemistry* (the chemistry that underpins the pharmaceutical and biotech industry) in aid of nanotechnology constructed from DNA. The long-term objective of this particular project is the successful operation of DNA nanoswitches in self-contained systems for biosensing and computing applications. A computer monitor can deliver light to particular parts of the screen to make a pattern. We intend to use *patterns* of DNA switches that are controlled by technology similar to a computer monitor: where the light hits the pattern of DNA, a switch corresponding to that part of the pattern will ultimately be activated. This project will aid this objective by developing methodologies that allow the construction and operation of these patterns of DNA.

This project will set up a lab to train the next generation of Californian scientists and science-literate citizens. It is expected to attract federal money to support nanotechnology in California and may lead to the formation of nascent industries.