SOLID-STATE AND BIOLOGICAL SYSTEMS INTERFACE

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The complexity, programmability, small size, and low cost of solid-state devices in direct contact with biological samples and living organisms can offer new capabilities in biology and biotechnology. We are developing several interfaces between solid-state and biological systems. At the molecular level, we build massively parallel device arrays to analyze proteins and DNA in low-cost, chip-scale platforms. The interface uses large-strength charge/photon coupling as well as low-noise spin coupling. At cellular level, we seek to stimulate, train, and monitor electrochemically, interconnected neurons cultured on solid-state chips, where our long-term goals are: 1) helping understand, in biologically relevant terms, informatics of neural interactions; 2) interfacing sensory systems with ICs to enable autonomous machines that exploit adaptive functions of living organisms. In this presentation I will share a few example works of ours along this direction.

References:


Keyword: Biochip, protein chip, DNA array, spin resonance, solid-state circuits, electrochemistry, neurobiology.

\(^*\)Typeset names in 12 pt Times Roman, uppercase. Use the footnote to indicate the present or permanent address of the author.