Quantum Dots: Beyond the “Light Bulb” Approach

Long-term, real-time monitoring of cellular activity is crucial for cell biology. Due to their noninvasive nature, optical approaches are best suited for this task. The ability to activate cells by changing the membrane potential without using pharmacological or chemical intervention remains a huge challenge for optical assays. We are utilizing unique photophysical properties of nanoparticles to develop the platform for light-controlled activation of excitable cells.

In addition, we are developing novel optical voltage sensors based on semiconductor nanocrystals. Whereas commercial Qdot® nanoparticles are insensitive to the local environment, our custom-engineered nanomaterials can detect changes in trans-membrane voltage gradient and report them as a change in their emission properties.