Integrating Nanotechnology with Cell Biology and Neuroscience

INCBN IGERT Seminar
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Learning from Nature: A Novel Bio-Inspired Imager

Try to use your mobile phone camera in a dimly lit room, and you get horribly poor videos, while you can see objects very clearly. The amount of light entering the aperture of your phone’s camera and your pupil are about the same, but that is where the similarities between the two imaging systems end. Our eye is equipped with light sensors that are working close to the quantum mechanical limit of sensing – they can sense a single photon. However, the best existing imagers are orders of magnitude less sensitive. Inspired by the amazing performance of the rod cells in the eye, we have developed a semiconductor device that operates with similar underlying mechanisms as the rod cells. I will present single-element devices with significantly higher sensitivity compared with conventional detectors, due to a high internal gain and very low noise. I will also present recent results from our camera that uses a 2D array of such detector, and show that it can clearly see under low illumination, where state-of-the-art imagers fail.