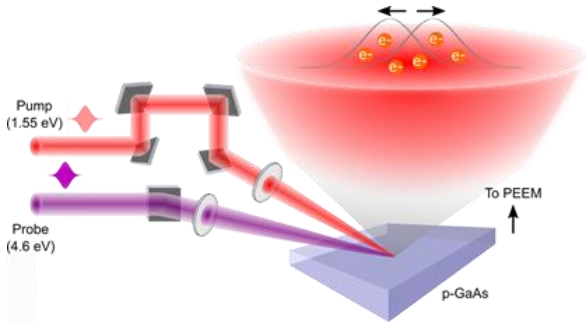
OIST OKINAWA INSTITUTE OF SCIENCE AND TECHNOLOGY GRADUATE UNIVERSITY
沖縄科学技術大学院大学

Pulling Apart Photoexcited Electrons

Applications

- Field programmable gate array (FPGA)
- Programmable Diode
- Nanoscale Circuits

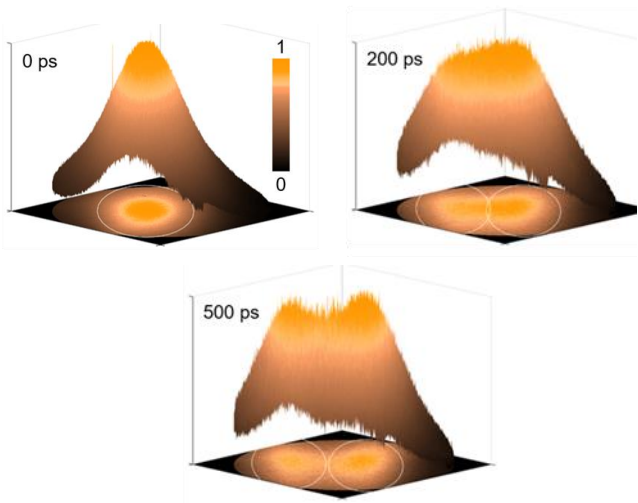


Schematic of an apparatus for the ultrafast separation of the photoexcited electrons within the optical spot.

Problem & Solution

The classic example of manipulating the distribution of photocarriers is the separation of unlike charges – electrons and holes, via an electric field or energy gradient. This has been the cornerstone of various opto-electronic technologies to date – solar cells, photodetectors, and others. However, being able to manipulate distributions of like photocarriers, say electrons, with high resolution would provide another, perhaps even more powerful, platform for future opto-electronic control.

This invention demonstrates a novel capability to move and redistribute photoexcited electrons within an optical spot on ultrafast timescales. This is done by generating local electric fields with high resolution using light that drive currents within the optical spot and manipulate the distribution of electrons. Specifically, using the intensity variations and specific angle for an optical pulse, local electric fields are generated in a doped semiconductor, which pull apart the distribution of the electrons on ultrafast timescales.



Schematic of pulling apart photoexcited electrons by optically inducing varying electric fields within a photoexcitation spot at high intensity.

Benefits

- Separation of like charges
- Femtoscale and nanoscale applications
- Ultrafast control (pico seconds)

Patent Pending

Keywords

Charge separation, semiconductor device, programmable gate array, femtoscale, nanoscale, and opto-electronic

For more information

Business Development/Technology Licensing Section
bdtl@oist.jp or +81-(0)98-966-8937