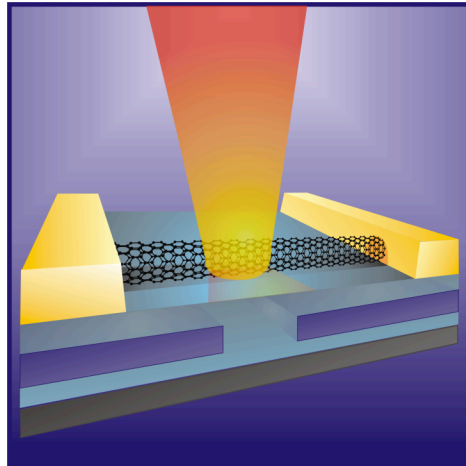


# Improving solar cells at a nanolevel

## Terahertz electrical characterization in nanomaterial photovoltaics



Terahertz electrical measurement enables the direct probing of sub-picosecond carrier dynamics in nanomaterial photovoltaics

### Objective:

- Develop THz electrical measurement technique for probing sub-picosecond carrier dynamics in nanomaterial photovoltaics.
- Understand the fundamentals of carrier multiplication process in individual nanoscale device.
- Demonstrate a working solar cell with improved efficiency by making use of carrier multiplication process.

### Approach:

- Utilize on-chip THz generation and detection technique for ultra-fast electrical measurement in nanoscale devices.
- Integrate novel nanomaterials for solar cell applications.

### Impact:

- Nanomaterial photovoltaics utilizing carrier multiplication process can improve the solar cell efficiency through creating more than one electron-hole pair for one high-energy photon.
- Understanding of the details of carrier multiplication process, as well as other ultra-fast carrier dynamics, can improve our fundamental knowledge of photo-electricity, and help the design of more efficient and low cost solar cell.

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### Facilities and infrastructure:

- Carbon nanotubes and Graphene synthesis setup and device fabrication facilities
- Femtosecond laser system for accessing sub-picosecond carrier dynamics
- Nanoelectronic testing setup