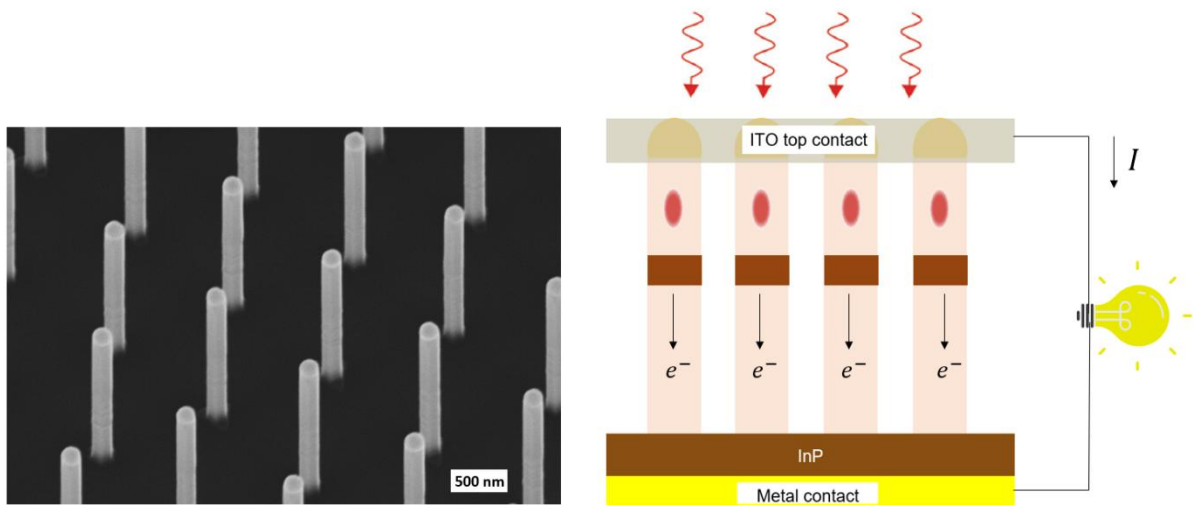


Hot-carrier solar cells based on nanowire arrays



The energy-conversion efficiency of most conventional single-pn-junction solar cells is limited ($\sim 30\%$) because a high fraction of absorbed energy is dissipated as heat. Recently, hot-carrier photovoltaic devices (HCPV) have emerged as a promising approach to enhance photovoltaic efficiency by extracting *hot* electron-hole pairs with excess kinetic energy. In our group, we have demonstrated hot-carrier extraction by integrating energy-selective filters into single-nanowire devices. To fully explore the potential of nanowire-based HCPV for solar cell conversion, our next step is to develop a large-area device in which a high density of nanowires is contacted in parallel to enable efficient light harvesting.

In this project, **you will realize a hot-carrier photovoltaic device based on vertically aligned nanowire arrays contacted in parallel using nanofabrication.** The main outcomes are:

- i) Fabrication of nanowire-based HCPV arrays
- ii) Photovoltaic characterization of the devices
- iii) Establishing a baseline for future hot-carrier solar cells

Specific tasks:

- Device fabrication in cleanroom using techniques such as spin-coating, photolithography, sputtering, metal evaporation, scanning electron microscopy (SEM), and more
- Photovoltaic characterization implementing solar simulators

Desirable skills:

- Prior experience and/or strong interest in cleanroom nanofabrication
- Data analysis using Python and/or MATLAB

During the project, you will gain an in-depth understanding of nanofabrication, optoelectronic devices, and photovoltaic systems. You will also work in a multidisciplinary environment within the groups of Heiner Linke and Magnus Borgström.

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