

Semiconductor Nanowires for Energy Conversion

Peidong Yang

Department of Chemistry, University of California, Berkeley, CA 94720

Semiconductor nanowires represent an important class of nanostructure building block for photovoltaics as well as direct solar-to-fuel application because of their high surface area, tunable bandgap and efficient charge transport and collection. In this talk, I will highlight several recent examples in this lab using semiconductor nanowires and their heterostructures for the purpose of solar energy harvesting. In addition, we have also discovered that the thermoconductivity of the silicon nanowires can be significantly reduced due to phonon scattering, pointing to a very promising approach to design better thermoelectrical materials. It is important to note that the engines that generate most of the world's power typically operate at only 30–40 per cent efficiency, releasing roughly 15 terawatts of heat to the environment. If this “wasted heat” could be recycled, the impact globally would be enormous. Our silicon nanowire thermoelectric technology could have a significant impact in alternative energy generation.