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Probing Interface Band Edge Discontinuity in Single Core-shell Nanowire by Photocurrent Spectroscopy GUANNAN CHEN, Department of Materials Science & Engineering, Drexel University, GUAN SUN, YUJIE DING, Department of Electrical & Computer Engineering, Lehigh University, ILIO MACCOLI, NICO LOVERGINE, Department of Innovation Engineering, University of Salento, Italy, PAOLA PRETE, IMM-CNR, Lecce, Italy, JONATHAN SPANIER, Department of Materials Science & Engineering, Drexel University — Group III-V co-axial core-shell semiconducting nanowire (NW) heterostructures possess unique advantages over their planar counterparts in logic, photovoltaic and light-emitting devices. Dimensional confinement of electronic carriers and interface complexity in NWs are known to produce local electronic potential landscapes along the radial direction that deviate from those along the normal to planar heterojunction interfaces. However, understanding of electronic and optoelectronic carrier transport properties and device characteristics remains lacking without a direct measurement of band alignment in individual NWs. Photocurrent spectroscopy has proven to be effective in investigating the effects of quantum confinement and surface related properties such as bandgaps, surface adsorption/desorption, and polarization anisotropy. Here, we report on, using the GaAs/$Al_xGa_{1-x}As$ core-shell NW system ($x = 0.24$ and 0.33), how photocurrent and photoluminescence spectroscopies can be used together to construct a band diagram of an individual heterostructure NW with high spectral resolution. This approach and results are relevant for the study of tunable hot electron transfer across NW core-shell interfaces.

Guannan Chen
Department of Materials Science & Engineering, Drexel University

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