Photons, electrons, and phonons; OLED, OFET, and OPV

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First discovered at the beginning of the 20th century but still only partially understood today, organic semiconductors combine the electrical and optical properties typical of inorganic semiconductors with properties such as flexibility, low cost, and structural tunability via chemical modification. They are of significant interest due to their potential for opto-electronic applications such as displays, photosensors and solar cells. Charge transfer compounds, which are made of two or more organic molecules in which one species acts as a donor of electric charge and the other as an acceptor, could provide new properties or improved performance to increase the range of application of organic semiconductors. I will discuss how optical measurements such as resonant Raman scattering and transient absorption, when combined with numerical calculations, can elucidate the physics of the subtle interplay of interactions that is critical to applications of these materials in 21st-century opto-electronic devices.

Laurie McNeil is the Bernard Gray Distinguished Professor of Physics at the University of North Carolina at Chapel Hill. She received her PhD from the University of Illinois at Urbana-Champaign, and has spent fellowship or sabbatical research visits at MIT, Argonne National Laboratory, DuPont Central Research and Development Laboratory, and Nanyang Technological University in Singapore. She uses optical spectroscopies to understand structure-property relationships in insulators, semiconductors, and biological tissue. She is a Fellow of the American Physical Society and currently serves as the Vice Chair of the Forum on Education of the APS.