

The research of Dr. Rafi Shikler focuses on studying electronic and optical processes in optoelectronic devices based on polymers and organic molecules in order to fabricate new devices or new architectures for operating devices.

This goal can be approached from three different angles. In the first, we study degradation processes in organic devices such as organic solar cells, organic light emitting diodes, organic transistors and organic flash memories. We use a combination of atomic force microscope with a Raman spectrometer to detect chemical changes with high spatial resolution. We already developed a new approach to surface enhanced Raman spectroscopy that allows selective vertical studies on degradation processes in organic device with vertical structures such as, OLED and OSC. We also study charge retention in organic flash memories in order to develop improved architecture for information storage.

The second angle focuses on integration of different optoelectronic devices to form a new device. We are part of a joint work on combining IR detector with OLED structure for night vision system. In this work we are responsible to the fabrication of the OLED and its integration with a transparent cathode. We also work on combining organic solar cell with organic thin film transistor for light detection.

The last angle is focuses on the study of new materials for devices. We are collaborating with Prof. Lemcoff from the department of Chemistry on studying if conduction mechanisms in organo-metallic compounds. We also work on nonlinear optoelectronic effects in polymer in order to fabricate new devices.