Abstract Submitted
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Energy level alignments and photocurrents in crystalline Si - organic semiconductor heterojunction diodes IAN CAMPBELL, Los Alamos National Lab — We investigate energy level alignment and photocurrent in crystalline silicon/organic/semitransparent metal diodes. Thin films of MEH-PPV, PFO, pentacene, and C_{60} were deposited on n and p type Si wafers and diode structures were formed by depositing either an Au anode or Al cathode onto the organic film. The energy level alignment was assessed using built-in potential and capacitance-voltage measurements. In all cases, the results are consistent with near ideal vacuum energy level alignment between the organic and inorganic semiconductor. The current-voltage characteristics are consistent with the electronic structure results and, for MEH-PPV, could be described by an organic device model. With the exception of pentacene, the photocurrent results are consistent with the electronic structure and the properties of the individual materials. Photocurrents in Si/C_{60} diodes exhibited both photoconductive gain and bias tunable wavelength response, demonstrating that these structures have potentially useful optoelectronic properties.

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