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Excited states at polymer semiconductor heterojunctions.

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Excitons in bulk organic semiconductors are generally strongly bound due to the weakly-screened electrostatic electron-hole interaction, but can be de-stabilized at heterojunctions between semiconductors with substantial band-edge offsets. The charge-transfer states that then forms at the heterojunction (exciplexes) can still show radiative emission (with strongly increased radiative lifetimes and large red-shifts), and still require an external field to enable long-range charge separation as required in a photovoltaic diode. The effect of DC field on this process of charge separation, will be discussed, as measured by the suppression of exciplex luminescence and photocurrent. The strength of interchain interactions can be increased under pressure, and measurements of absorption and time-resolved luminescence under hydrostatic pressure will be reported. These reveal the changing character of the exciplex at the heterojunction.