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**Quasiguided optical modes in nanophotonic organic solar cells**

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University of North Carolina - Chapel Hill — Organic photovoltaics with highly ordered, nanopatterned photoactive layers offer an alternative to conventional planar devices that suffer from a competition between absorption and free carrier transport. Our recent studies have shown that nanopatterned devices exhibit enhanced absorption and exciton creation profiles as compared to planar cells. Improved absorption results in part from the excitation of quasiguided optical modes where certain photon energies near the semiconducting band edge are enhanced 20-fold. Prerequisites for their excitation include an index of refraction contrast of 0.3 for the two nanopatterned materials and a periodicity comparable to the band edge wavelength. Quasiguided mode dispersion determined via photonic band calculations and variable angle absorption measurements indicate that both fast and slow modes exist in nanopatterned devices. Quantum efficiency measurements also confirm that quasiguided mode excitation occurs in the photoactive material leading to improved electrical performance.

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