

Abstract Submitted
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High efficiency morphologies for bulk heterojunction solar cells¹

KITRAN COLWELL, University of California, San Diego, LUCAS WAGNER, JEFFREY GROSSMAN, Massachusetts Institute of Technology — Inexpensive high efficiency solar cells represent a potentially transformative technology in energy production. One possible route to these devices is to construct them of two inexpensive materials in a type II heterojunction. The mixing morphology becomes important due to a bound exciton that can only separate at an interface and the need for good charge carrier transport. The optimum morphology is determined by the competition between these two loss mechanisms, and is currently unknown for the general problem. We use a grid-based kinetic Monte Carlo model to explore the morphology space in these devices. We find that it is possible to attain a high efficiency without a large degree of ordering, which may be a route towards manufacturing higher efficiency bulk heterojunctions inexpensively.

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Lucas Wagner
Massachusetts Institute of Technology

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