

Abstract Submitted
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Calculation of efficiency losses in Cu(In,Ga)Se₂/CdS solar cells with ultra-thin absorbers ANA KANEVCE, JAMES SITES, Colorado State University — One of the main obstacles for commercialization of solar cells based on Cu(In,Ga)Se₂ absorbers is the price and unavailability of indium. An obvious way to reduce the amount of indium required is to reduce the thickness of the Cu(In,Ga)Se₂ absorber. This work uses numerical simulations to investigate the physical aspects of the changes that should occur with thinner absorbers. As the thickness becomes smaller than the diffusion length, the back-contact recombination losses increase. Increased Ga content towards the back contact can improve the carrier collection and lower the recombination loss. The influence of Ga/In distribution throughout the absorber and the necessary Ga/In ratio are calculated. The effect of nonuniformities on the solar cell behavior has been investigated, with emphasis on comparison between thinner (below 500 nm) and thicker (1 micron and above) devices. Devices thinner than 500 nm are less forgiving to thickness nonuniformities than the thicker ones. Band-gap nonuniformities cause collection problems and lower the fill-factor.

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