Abstract Submitted
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High-Efficiency Photovoltaic Energy Conversion using Surface Acoustic Waves in Piezoelectric Semiconductors VICTOR YAKOVENKO, University of Maryland at College Park — We propose a radically new design for photovoltaic energy conversion using surface acoustic waves (SAWs) in piezoelectric semiconductors. The periodically modulated electric field from SAW spatially separates photogenerated electrons and holes to the maxima and minima of SAW, thus preventing their recombination. The segregated electrons and holes are transported by the moving SAW to the collecting electrodes of two types, which produce dc electric output. Recent experiments [1] using SAWs in GaAs have demonstrated the photon to current conversion efficiency of 85%. These experiments were designed for photon counting, but we propose to adapt these techniques for highly efficient photovoltaic energy conversion. The advantages are that the electron-hole segregation takes place in the whole volume where SAW is present, and the electrons and holes are transported in the organized, collective manner at high speed, as opposed to random diffusion in conventional devices.

[1] S. J. Jiao, P. D. Batista, K. Biermann, R. Hey, and P. V. Santos, *J. Appl. Phys.* **106**, 053708 (2009).

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