

Abstract Submitted
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Nonradiative lifetimes in intermediate band materials – absence of lifetime recovery¹ JACOB J. KRICH, Harvard University, Department of Chemistry and Chemical Biology, BERTRAND I. HALPERIN, Harvard University, Department of Physics, ALÁN ASPURU-GUZIŁ, Harvard University, Department of Chemistry and Chemical Biology — Intermediate band photovoltaics hold the promise of being highly efficient and cost effective photovoltaic cells. Intermediate states in the band gap, however, are known to facilitate nonradiative recombination. Much effort has been dedicated to producing metallic intermediate bands in hopes of producing *lifetime recovery* – an increase in carrier lifetime as doping levels increase. We show that lifetime recovery induced by the insulator-to-metal transition will not occur, because the metallic extended states will be localized by phonons during the recombination process. Only trivial forms of lifetime recovery, e.g., from an overall shift in intermediate levels, are possible. Future work in intermediate band photovoltaics must focus on optimizing subgap optical absorption and minimizing recombination, but not via lifetime recovery.

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