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Electronic transport of femtosecond-laser created sub-bandgap absorbers MENG-JU SHER, Harvard University, MARK WINKLER, ERIC MAZUR, Harvard University — Femtosecond laser irradiation can dope silicon with sulfur to concentrations above the Mott transition threshold. This material exhibits near-unity, broadband absorption for photon energies lower than 0.5 eV, deep below the silicon bandgap, and is potentially useful for photovoltaic applications. In addition, this material exhibits metallic-like conduction. The unusual optical and electronic properties of femtosecond laser-doped silicon suggest the formation of an intermediate band. In this poster, we will report on the femtosecond laser doping technique, as well as temperature-dependent Hall measurements on silicon doped with varying sulfur concentrations. These measurements reveal on the nature of electronic transport in this novel material, as well as identify the energy states of the sulfur donors and hence the location of the intermediate band. We will also discuss potential applications for intermediate band photovoltaics.

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