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Determining the bandtail shape of highly Si-doped $Al_{0.3}Ga_{0.7}As$ using persistent photoconductivity JENNIFER MISURACA, STEPHAN VON MOLNAR, PENG XIONG, MARTECH, Florida State University, JELENA TRBOVIC, Institute of Physics, University of Basel, JUN LU, JIANHUA ZHAO, Institute of Semiconductors, Chinese Academy of Sciences, HIDEO OHNO, Tohoku University — Highly Si-doped $Al_{0.3}Ga_{0.7}As$ can be driven through the metal-insulator phase transition using persistent photoconductivity [1]. Owing to the bi-stable nature of the Si donor, samples cooled in the dark are insulating. In the present work, an infrared LED is used to photodope the sample at 5K for a range of illumination times, which populates shallow states and provides a way to change the carrier concentration of the sample *in situ*. Measuring the carrier concentration as a function of temperature allows for the infinite temperature carrier concentrations and Hall activation energies to be extracted for various illumination times as the Fermi energy is tuned systematically. Application to Si- doped $Al_{0.3}Ga_{0.7}As$ prepared by MBE allows one to infer the bandtail shape [2] in the energy range between the Fermi energy of the unilluminated sample and the mobility edge. [1] S. Katsumoto, et al. J. Phys. Soc. Jpn. 56, 2259 (1987) [2] I. Terry, et al. Solid State Commun. 84, 235 (1992)

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