

- [59] J. M. Dorkel and P. Leturcq, Carrier mobilities in silicon semi-empirically related to temperature, doping and injection level, *Solid-State Electron.* **24**, 821 (1981).
- [60] B. Michl, J. Benick, A. Richter, M. Bivour, J. Yong, R. Steeman, M. C. Schubert, and S. W. Glunz, Excellent average diffusion lengths of $600\ \mu\text{m}$ of *n*-type multicrystalline silicon wafers after the full solar cell process including boron diffusion, *Energy Procedia* **33**, 41 (2013).
- [61] T. Tiedje, B. Abeles, D. L. Morel, T. D. Moustakas, and C. R. Wronski, Electron drift mobility in hydrogenated *a*-Si, *Appl. Phys. Lett.* **36**, 695 (1980).
- [62] A. D. Wright, R. L. Milot, G. E. Eperon, H. J. Snaith, M. B. Johnston, and L. M. Herz, Band-tail recombination in hybrid lead iodide perovskite, *Adv. Funct. Mater.* **27**, 1700860 (2017).
- [63] P. Prins, F. C. Grozema, J. M. Schins, and L. D. A. Siebbeles, Frequency dependent mobility of charge carriers along polymer chains with finite length, *Phys. Status Solidi* **243**, 382 (2006).
- [64] M. J. Bird, O. G. Reid, A. R. Cook, S. Asaoka, Y. Shibano, H. Imahori, G. Rumbles, and J. R. Miller, Mobility of holes in oligo- and polyfluorenes of defined lengths, *J. Phys. Chem. C* **118**, 6100 (2014).
- [65] P. Kužel and H. Němcová, Terahertz spectroscopy of nanomaterials: A close look at charge-carrier transport, *Adv. Opt. Mater.* **8**, 1900623 (2020).
- [66] See the Supplemental Material at <http://link.aps.org/supplemental/10.1103/PRXEnergy.1.023008> for discussions of “*a*”-factor determination, additional experimental data, methods, *K*-factor determination, influence of TRMC detector and injection level, sample preparation, literature comparison, and fitting method; Figures S1–S13; and Tables S1–S3.
- [67] C. Rønne, L. Thrane, P.-O. Åstrand, A. Wallqvist, K. V. Mikkelsen, and S. R. Keiding, Investigation of the temperature dependence of dielectric relaxation in liquid water by THz reflection spectroscopy and molecular dynamics simulation, *J. Chem. Phys.* **107**, 5319 (1997).