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Contactless Spectral-dependent Charge Carrier Lifetime Measurements in Silicon Photovoltaic Materials JOHN ROLLER, BEHRANG HAMADANI, NIST - Natl Inst of Stds Tech, MARIO DAGENAIS, University of Maryland - College Park — Charge carrier lifetime measurements in bulk or unfinished photovoltaic (PV) materials allow for a more accurate estimate of power conversion efficiency in completed solar cells. In this work, carrier lifetimes in PV-grade silicon wafers are obtained by way of quasi-steady state photoconductance measurements. These measurements use a contactless RF system coupled with varying narrow spectrum input LEDs, ranging in wavelength from 460 nm to 1030 nm. Spectral dependent lifetime measurements allow for determination of bulk and surface properties of the material, including the intrinsic bulk lifetime and the surface recombination velocity. The effective lifetimes are fit to an analytical physics-based model to determine the desired parameters. Passivated and non-passivated samples are both studied and are shown to have good agreement with the theoretical model.

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