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Photocurrent noise in organic bulk heterojunction solar cells N.S. VIDHYADHIRAJA, MONOJIT BAG, K.S. NARAYAN, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India — We report the first electrical noise measurements from illuminated bulk heterojunction polymer based solar cells. The dependence of photocurrent fluctuations on temperature, light intensity and device conditions was analyzed. We find flicker noise of the form $1/f^\alpha$ at low frequencies (<1 kHz). An unusual log-normal feature in the noise power spectrum is observed in the frequency regime > 5 kHz. We develop a theoretical description employing kinetic Monte-Carlo simulations that points to the importance of a mobility edge in the understanding of fluctuations in the low frequency regime, while also capturing the temperature dependence of the noise amplitude. We find that a Gaussian disorder model with uncorrelated traps is not sufficient to describe the log-normal feature, thus highlighting the significance of spatial and/or energetic correlations among the trap states.

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