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Time dynamics of self-pumped reflection gratings in a photorefractive polymer

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ABSTRACT

The time dynamics of self-pumped reflection gratings in a commonly used photorefractive polymer PDCST:PVK:ECZ-BBP:C_{60} with no additional electron sources or traps is investigated. While holes are normally the mobile charges and responsible for grating formation, our experimental observations, analyzed using multi-exponential fitting curves, show evidence of electrons in addition to holes as charge carriers, particularly above an applied field of 40 V/μm. The dependence of effective carrier mobilities on the applied electric field, deduced from experimental results, show stronger field dependence of electron mobility at high electric fields. At an applied field of 70 V/μm, electron and hole mobilities become approximately equal, and the contribution of electrons on grating formation becomes significant.