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Gain enhancement in photorefractive polymers

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Photorefractive (PR) polymer materials have shown that they can be successfully used in display applications due to a diffraction efficiency that is close to unity. The polymers rely on the cooperation between several components in order to generate the charge carriers, space-charge field, and the refractive index change as required for both diffractive and beam-coupling applications. The multi-component approach has several unforeseen consequences, such as multiple PR gratings (hole and electron) and sub-optimal phase shifts which decrease the potential (PR) gain. We show that by applying electric fields close to the breakdown potential to PR polymers, the decreased beam coupling and diffraction efficiency can be overcome by reducing the grating competition (hole vs. electron) leading to an enhanced PR gain/efficiency.

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