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Transient absorption and nonlinear refractive index changes in thermally reduced nominally pure $LiNbO_3$ by sub-100-fs light pulses[1]
HOLGER BADORRECK, VOLKER DIECKMANN, MIRCO IMLAU, Department of Physics, University of Osnabrueck, Osnabrueck, Germany — Due to its polaronic features nominally undoped lithium niobate—as grown and thermally reduced—is of great interest for ultrafast optical devices. With formation times in the sub-ps-range short-lived small polarons can be generated in thermally reduced lithium niobate by optical gating of bipolarons due to single photon absorption. Simultaneously, formation of small hole polarons by two-photon-absorption is observed. In this work nonlinear absorption and refractive index changes due to exposure to sub-100-fs light pulses of 488 nm are presented with thermally reduced crystals as an example. It is found that the two-photon absorption coefficient is not affected by the thermal reduction procedure, whereas the nonlinear refractive index change is considerably smaller in the reduced sample. We further present our results on the study of the transient absorption in the blue and NIR spectral range by means of fs-pump-probe technique. The influence of the thermal reduction procedure on lifetime and densities of electron and hole polarons is discussed.

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