

2.2 Photorefractive Characterization of Doped KNbO₃ Crystals for Application in the Red and Near Infrared

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Applications of the photorefractive effect are particularly interesting for wavelength in the red and near infrared due to availability of small and compact coherent light sources. Pure photorefractive crystal such as KNbO₃ or BaTiO₃ show no absorption in the infrared, and are therefore not photorefractive there. By changing the growth parameters of the crystals, for example introducing different dopants or controlling the atmosphere during growth, it is possible to obtain additional energy levels (traps) between valence and conduction band. If this new energy levels are near enough to a band, the crystal will show an absorption, which can give a photorefractive effect in the infrared. The investigation of photorefractive properties of KNbO₃ is done with two beam coupling. The effective trap density and the build-up time have been measured using different two beam coupling geometries. Rh doped KNbO₃ show an increased absorption peak at 850 nm and build-up times which are comparable with those in the blue spectral range. These crystals also show large beam fanning, which means that they are strongly photorefractive and most likely also suitable for self pumped phase conjugation in the infrared.