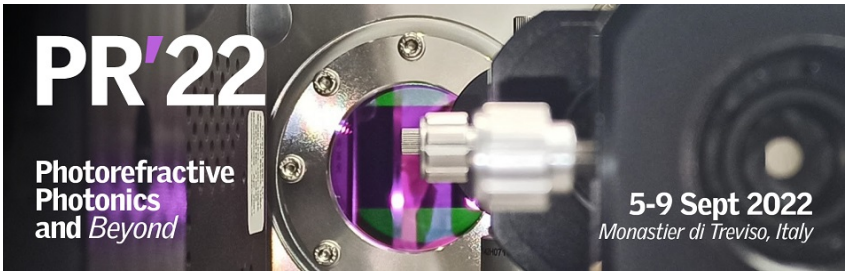

Contribution ID: **33** Type: **Regular Talk**

MgO-LiNbO3 film: an appealing photorefractive medium

Tuesday 6 September 2022 15:40 (25 minutes)

LiNbO3 films constitute an attractive photorefractive medium offering the possibility of inducing reconfigurable optical functions either with beams guided in the film or with an illumination transverse to the film. Several additional motivations animate the study of the photosensitivity of LiNbO3 films. Performances such as sensitivity and response time are improved compare to bulk due to the specificity of the geometry that confines both light and charges in one dimension. Moreover, interaction between beams is facilitated by the planar arrangement, novel architectures are conceivable through the control of guided beams using an external writing beam and potential applications are expanded with the possibility of integration of photonic and electronic components considering LiNbO3 films on silicon.
To further illustrate this potential, we present surprising results on the photosensitivity of MgO-doped LiNbO3 films. We show that guided beams of few microwatts can self-focus efficiently by photorefractive effect triggered by pyroelectricity. The experimental observations are performed in a slab waveguide consisting of a 7µm thick LiNbO3 layer doped with 5%mol of magnesium oxide (MgO) adhered with a silica layer onto a silicon wafer. Despite the MgO doping, known to reduce the PR effect, the efficiency of the self-trapping is comparable with the one observed in undoped layers but with much faster response. Measurements show that milliseconds response time can be reached with power beam on the order of milliwatt at 532nm. The observed self-focusing dynamics is exploited to better comprehend the underlying physics.

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Session Classification: Materials micro- and nano-engineering

Track Classification: Novel photorefractive and hybrid materials