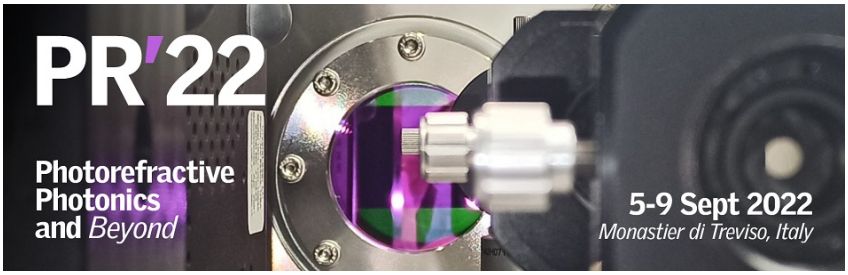

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High-Performance Co-Doped Photorefractive Sn2P2S6 Crystals

Thursday 8 September 2022 16:40 (1h 30m)

The Sn2P2S6 crystals are known as efficient photorefractive materials, that can be efficiently modified by their doping. Our recent works are directed to a search for the new efficient dopants and their combinations, which are provided by two methods: growth in the presence of two types of the impurities, and by the indiffusion of the metals (Cu, Ag) into previously grown samples. In the communication, we present the results of the complex investigations of the optical and photorefractive parameters of the various co-doped Sn2P2S6 crystals.
It was found that the most promising for photorefractive applications is the co-doping of Sn2P2S6 by Cu+Sb. The main advantage of this composition is the single-exponential dynamics of the photorefractive response when the formation of the space-charge grating occurs practically without the compensation processes that are usually observed in other doped Sn2P2S6 crystals. The experimental results correlate with ab initio calculations of the electron spectra in the Sn2P2S6 with two defects (Cu and Sb), showing that they both probably are forming the single defect electron level in the gap.
These co-doped crystals also demonstrate a high enough two-wave mixing gain at 633 nm, which allows realizing various photorefractive schemes on their base. This is illustrated by studying the performances of two optical schemes: the dynamic interferometer based on the two-wave mixing, and the semi-linear oscillator scheme with high efficiency and low generation threshold compared with other doped Sn2P2S6 compounds.

Authors: Prof. GRABAR, Alexander (Uzhhorod University); Dr ANTON, Kohutych (Uzhhorod University); Dr GLUKHOV, Konstantin (Uzhhorod University); TSYHYKA, Mykhailo (Uzhhorod University); Dr HASYNETS, Stepan (Uzhhorod University)

Presenter: Prof. GRABAR, Alexander (Uzhhorod University)

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