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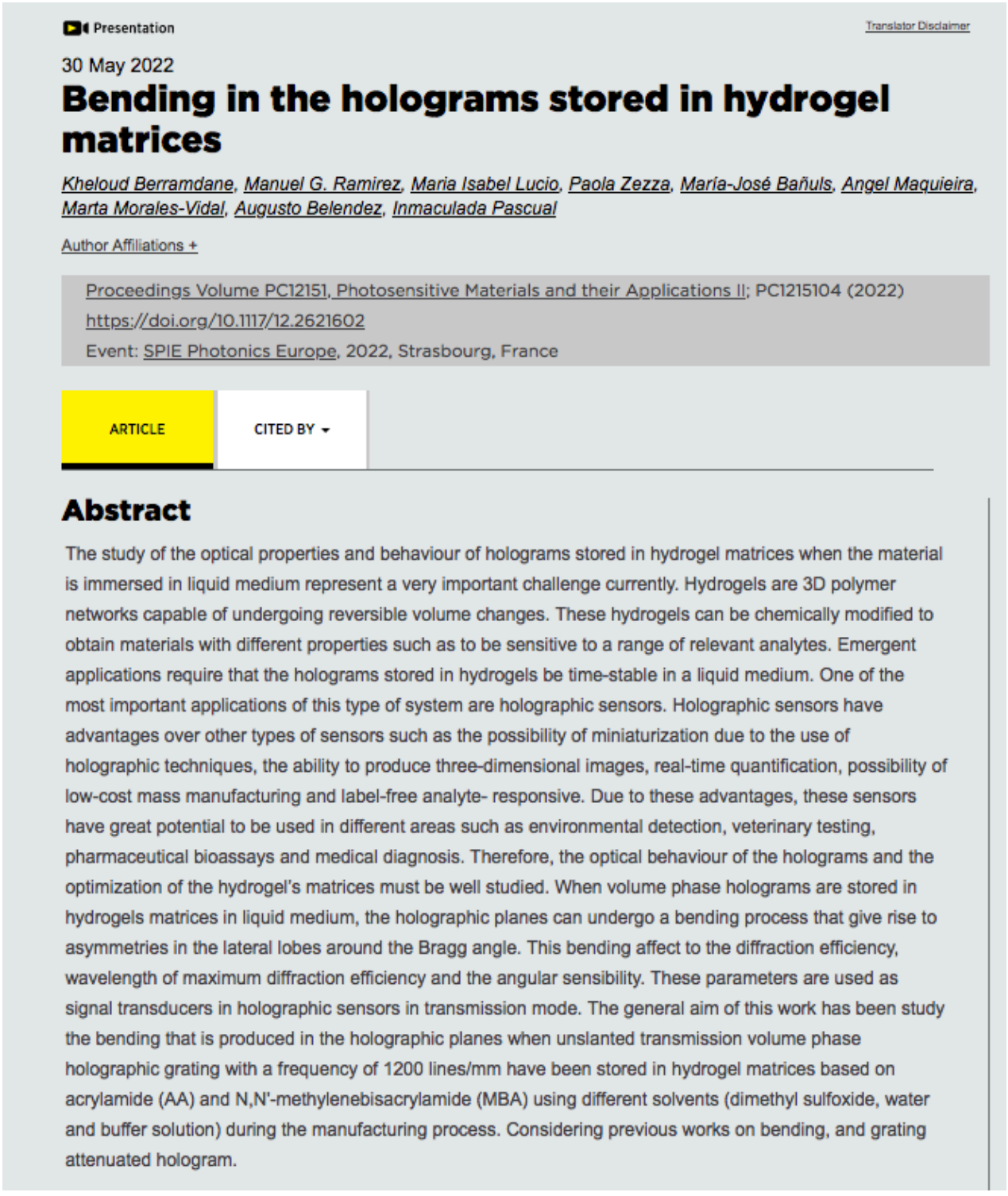

Presentation

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Bending in the holograms stored in hydrogel matrices

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Abstract

The study of the optical properties and behaviour of holograms stored in hydrogel matrices when the material is immersed in liquid medium represent a very important challenge currently. Hydrogels are 3D polymer networks capable of undergoing reversible volume changes. These hydrogels can be chemically modified to obtain materials with different properties such as to be sensitive to a range of relevant analytes. Emergent applications require that the holograms stored in hydrogels be time-stable in a liquid medium. One of the most important applications of this type of system are holographic sensors. Holographic sensors have advantages over other types of sensors such as the possibility of miniaturization due to the use of holographic techniques, the ability to produce three-dimensional images, real-time quantification, possibility of low-cost mass manufacturing and label-free analyte- responsive. Due to these advantages, these sensors have great potential to be used in different areas such as environmental detection, veterinary testing, pharmaceutical bioassays and medical diagnosis. Therefore, the optical behaviour of the holograms and the optimization of the hydrogel's matrices must be well studied. When volume phase holograms are stored in hydrogels matrices in liquid medium, the holographic planes can undergo a bending process that give rise to asymmetries in the lateral lobes around the Bragg angle. This bending affect to the diffraction efficiency, wavelength of maximum diffraction efficiency and the angular sensibility. These parameters are used as signal transducers in holographic sensors in transmission mode. The general aim of this work has been study the bending that is produced in the holographic planes when unslanted transmission volume phase holographic grating with a frequency of 1200 lines/mm have been stored in hydrogel matrices based on acrylamide (AA) and N,N'-methylenebisacrylamide (MBA) using different solvents (dimethyl sulfoxide, water and buffer solution) during the manufacturing process. Considering previous works on bending, and grating attenuated hologram.