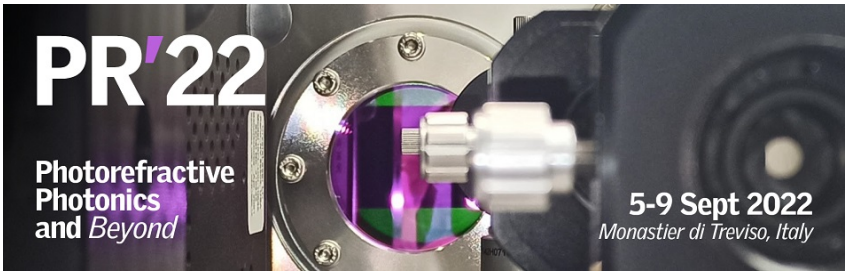

Contribution ID: **28** Type: **Regular Talk**

Light and thermally-induced charge transfer phenomena at ferroelectric crystal surfaces

Thursday, 8 September 2022 10:00 (25 minutes)

Lately, evanescent electric fields generated by the bulk photovoltaic (PV) effect and the pyroelectric (PY) effect have attracted significant interest for multiple applications (particle/droplet manipulation and trapping, droplet dispensing, electrowetting, orientation of liquid crystals, etc). In this context the ferroelectric surface plays a key role, and we have discovered a new interaction mechanism when ferroelectrics come into contact with other objects, exploiting the PV and PY effects. On one hand, in this work we present experimental evidence of a charge transfer between ferroelectric crystals and micro/nanoparticles in contact with their surface, driven by optical or thermal stimuli. We have thoroughly studied the influence of the type of particle (metallic or dielectric), crystal orientation, light intensity, wavelength and surrounding medium. Furthermore, although most experiments have been conducted with LiNbO3:Fe crystals, we have also tested the effect in other ferroelectrics (such as LiTaO3), thanks to the generality of the PY effect. On the other hand, we have taken this new mechanism one step further and demonstrated the feasibility of transferring PV/PY surface charge patterns to passive dielectric substrates. The procedure is simple and resembles the operation of a stamp: upon contact, part of the PV/PY charge is transferred and stored at the surface of the dielectric substrate. Those charge patterns have been exploited to massively trap and assemble micro/nanoparticles, obtaining very similar particle distributions on the active ferroelectric crystal and the passive substrate. Overall, this charge transfer phenomenon opens the way towards novel functionalities and applications of ferroelectric platforms.

Primary authors: Mr SEBASTIÁN-VICENTE, Carlos (Departamento de Física de Materiales, Universidad Autónoma de Madrid); Dr GARCÍA-CABAÑES, Angel (Departamento de Física de Materiales, Universidad Autónoma de Madrid); Prof. CARRASCOSA, Mercedes (Departamento de Física de Materiales, Universidad Autónoma de Madrid)

Presenter: Mr SEBASTIÁN-VICENTE, Carlos (Departamento de Física de Materiales, Universidad Autónoma de Madrid)

Session Classification: Photorefractive hybrid systems

Track Classification: Materials