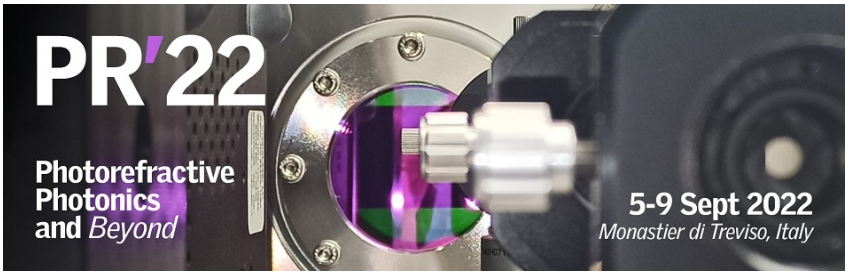

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NIR-to-NIR-imaging via polar oxide nanoparticles

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Polar oxide nanoparticles like LiNbO3, KNbO3 or NaNbO3, are of increasing interest as multimodal markers in biological environment thanks to the their pronounced electro-optical, piezo-electrical, pyro-electrical, photorefractive and nonlinear optical effects. For instance, the latter one allows for a particular type of multiphoton imaging (non-bleaching, non-blinking, high-contrast, etc.) where the established fluorescent nanomarker fails. The further effects are promising for the context of optogenetics, e.g. in the framework of the manipulation of the cellular environment via the electrostatic field.

The possibility to trigger two or more of these effects simultaneously make polar oxide nanoparticles a unique biocompatible marker platform. From the scientific viewpoint, an advantage is the comprehensive know-how on the photophysical effects gained over several decades in bulk single crystals. It provides an outstanding basis for the study and application of these nanoparticles in this emerging field of application.

In this presentation we focus on the nonlinear optical characterization of polar oxide nanoparticles - and in particular on second and third harmonic generation. The analysis reveals that the harmonic emission can be continuously tuned to every wavelength in the UV/VIS, but also NIR for pumping up to 2400 nm. These results find their more important applications in-vivo imaging. Indeed, in the IR region the tissue shows reduced light scattering and absorption potentially permitting to perform deep-tissue imaging with the lowest light-induced damage. It is interesting to notice that the use of infrared light beyond 1700nm is not possible with other nanomarkers, offering a unique solution for NIR-to-NIR imaging.

Primary authors: VITTADELLO, Laura (Physics department, Osnabrueck university); KLENEN, Jan (Department of Physics, Osnabrück University, Barbarastraße 7, Osnabrück, Germany and Research Center for Cellular Nanoanalytics Osnabrück (CellNanOs), Osnabrück University, Barbarastraße 11, Osnabrück, Germany); KODDE, Felix (Osnabrück University); KOEMPE, Karsten (Department of Biology and Chemistry, Osnabrück University, Barbarastraße 11, Osnabrück, Germany and Research Center for Cellular Nanoanalytics Osnabrück (CellNanOs), Osnabrück University, Barbarastraße 11, Osnabrück, Germany); IMLAU, Mirco (Department of Physics, Osnabrück University, Barbarastraße 7, Osnabrück, Germany and Research Center for Cellular Nanoanalytics Osnabrück (CellNanOs), Osnabrück University, Barbarastraße 11, Osnabrück, Germany)

Presenter: VITTADELLO, Laura (Physics department, Osnabrueck university)

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