

PE14: Research and innovation on future tele communication systems and networks (RESTART)

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Project Information

Research project title

New materials for applications in modern telecommunication systems

Key words

Research project abstract.

Acentric crystals are endowed with quadratic nonlinear optical (NLO) properties. Two NLO effects relevant in telecommunications are linear electrooptic (LEO) effect and optical rectification (OR). LEO effect is the change of the index of refraction of a material upon application of an electric tension. The effect is used to convert electric into optical signals that travels along the optical fiber. OR effect can lead to the generation of THz waves, which are electromagnetic waves with frequency ranging from 0.1 to 30 THz, also referred to as (sub-) millimetres waves because of the wavelength, in the range 10 μm to 3 mm. The extension of the wavelengths exploited in telecommunications to the range of THz is a key point of 5G and 6G protocols. With respect to telecommunication applications, two relevant points are: THz wave generation and THz wave modulation. THz wave generation can be accomplished by suitable acentric crystals. THz wave modulation can be accomplished by nematic liquid crystals, endowed with high birefringence. The synthesis and characterization of acentric materials and high birefringence nematic liquid crystals are targets of the present proposal.