S3-O2
Analysis of Metal-Organic Framework Single Crystals for Possible THz Waves Emission and Sensing

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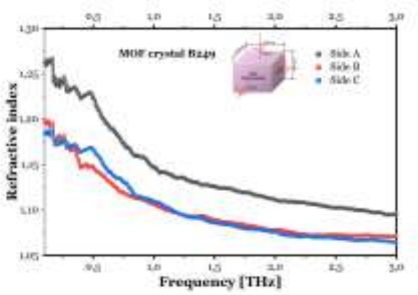
Abstract

The use of metal-organic frameworks (MOFs) for terahertz (THz) emission and sensing is still at its early development stage. Our motivation for a deep study on the present non-centrosymmetric MOF crystal, [Zn(3-ptz)2]n, produced using a novel solvothermal technique created by a Startup**,** "**MAQI**" from the University of Santiago de Chile is to widening the list of these hybrid materials capable to generate and detect THz waves. To follow through THz time-domain spectroscopy (TTDS), to obtain the optical constants parameters and dielectric properties, such as refractive index $n_{MOF(THz)}(\omega)$, absorption coefficient $\alpha_{MOF(THz)}(\omega)$, and conductivity (σ), from this MOF single crystals. The TTDS measurements were carried out inner the frequency range of 0.1 to 3 THz. The results support the research outputs published in our earlier work, shown its promising position as a material for THz waves transceiver and applications in optoelectronics, photonics, and materials science.

Introduction

Over the past few years, THz technologies working in the spectral range 0.1 - 10 THz, 3 mm to 30 μm in wavelength [1], located between FIR and $\mu - waves$ band of the electromagnetic spectrum, have made giant strides since the development of materials and methods for the emission and detection THz radiation. It has generated a field for highly encouraging in basic sciences, including biomedical, materials characterization, wireless communications, homeland security and myriad others. The motivation driving this work was integrate the studied of [Zn(3-ptz)2]n MOF crystals into nowadays gingerly increasing list of THz photonic new materials [2].



Obtained through $\boldsymbol{n_{MOF}(\omega) = 1 + \frac{c}{\omega_{THz} d} arg[H(\omega)]}$ RI for the MOF crystals B249, according to THz wave propagation direction through

Conclusions

In summary, the two, B248 and B249, millimeter-sized crystals derived from the same batch, Zn(3-ptz)2 MOF crystals, studied in this work, showed promising potentialities as THz transceiver material. Further confirmation through extensive and exhaustive experimental work is needed to establish it as a reliable material for this purpose, including its potential use in novel photonic and optoelectronic devices.

REFERENCES

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