

# Temperature-dependent birefringence behavior of NdGaO<sub>3</sub> probed by terahertz spectroscopy

Umar Farooq<sup>1</sup>, Gian Paolo Papari<sup>1,2</sup>, Zahra Mazaheri<sup>1</sup>, Junaid Yaseen<sup>1</sup>, and Antonello Andreone<sup>1,2</sup>

<sup>1</sup>Dipartimento di Fisica "Ettore Pancini", Università di Napoli "Federico II", Napoli, Italy

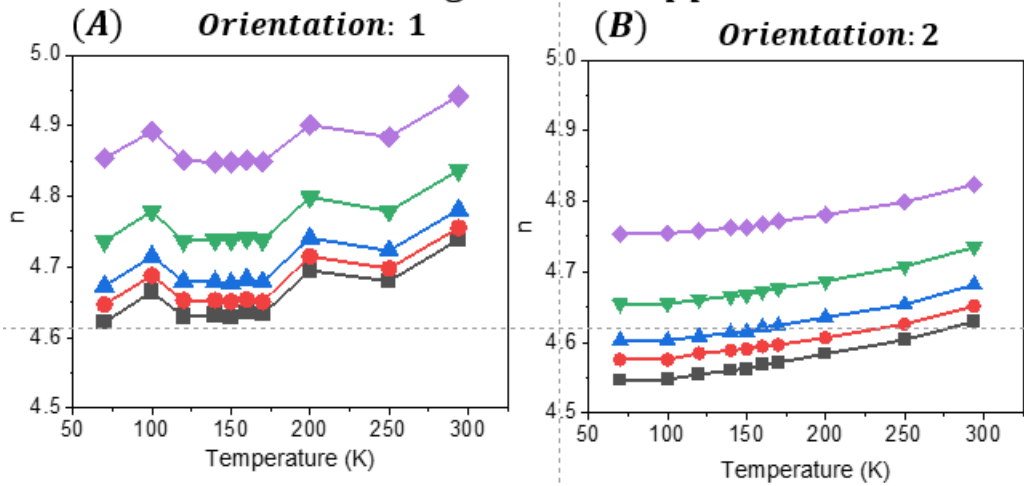
<sup>2</sup>CNR-SPIN, UOS Napoli, Napoli, Italy

**Abstract:** Time domain THz spectroscopy has been applied to measure the complex refractive index of Neodymium Gallate (NGO) samples. Temperature-dependent refractive index and birefringence properties of samples have been measured in the interval ranging between room temperature and 70K.

Neodymium Gallate (NGO) is a valuable crystal mostly employed for the epitaxial growth of thin films of current interest like Neodymium Nickelate NdNiO<sub>3</sub> [1], presenting a metal to insulator transition at liquid nitrogen temperatures, or GaN [2], since it provides a hetero-interface keeping film roughness as low as 0.5 nm. Similarly, NGO can be also used to deposit high-temperature superconductors [3], since it offers structural matching, low thermal expansion mismatch and low dielectric loss, or to fabricate Y: ZrO<sub>2</sub> thin films with an accurate control of the crystallographic orientation, strain and domain structure [4]. For all these reasons, it might be a useful practice to characterize this material in the THz region, to verify its feasibility for the development of novel devices operating at ultra-high frequencies.

By employing THz time domain spectroscopy, we measured the electromagnetic response of a NGO (110) slab in the frequency range (0.3 – 2.3) THz. By studying the variation of the complex transmission  $\tilde{T}(\omega)$  for different temperatures and crystal orientations, we have observed that the sample shows birefringence and dichroic characteristics. In Fig.1 some data showing the temperature dependence of the NGO refractive index (real part) and its birefringence are reported.

## Cooling – Down Approach



**Fig.1:** Temperature dependence of the NGO refractive index at a frequency range (0.3 – 2.3) THz for the two perpendicular orientations of the crystal.

### Contacts:

Umar Farooq ([umar.farooq@unina.it](mailto:umar.farooq@unina.it))

Gianpaolo Papari ([Gianpaolo.papari@unina.it](mailto:Gianpaolo.papari@unina.it))

### References

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