

Leonardo Oliveira

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About me

I'm a self-motivated Materials Physicist interested in unraveling the role of structural defects in functional materials using advanced synchrotron techniques. Currently, I'm engaged in investigating the intricate composition-structure-property relationships on deeply embedded defects in functional antiferroelectrics and ferroelectric materials. My expertise lies in Dark Field Hard X-Ray Microscopy, X-Ray diffraction, Rietveld method, crystallography, and developing python scripts for image processing.

Academic Education

Ph.D. 2021-8/2024	Technical University of Denmark – DTU Kongens Lyngby, Denmark Physics <i>Structure property relationship of individual types of defects in antiferroelectrics</i> Supervisors: Hugh Simons and Thomas Olsen
Interrupted 2017-2020	Federal University of ABC – UFABC Santo André, São Paulo, Brazil Nanoscience and Advanced materials <i>Physical property characterizations of $\text{Ln}_2\text{CoFeO}_6$ as new double perovskites</i>
MSc. 2015-2017	Federal University of Amazonas – UFAM Manaus, Amazonas, Brazil Materials science and Engineering <i>Structural metastability of Ni-Ti-Ge system induced by mechanical alloying</i>
BSc. 2010-2015	Amazonas State University – UEA Manaus, Amazonas, Brazil Mechanical Engineering

Skills

Perovskites,[Ⓢ] Ferroelectric & antiferroelectric materials,[Ⓢ] XRD & Rietveld Method,[Ⓢ] Impedance spectroscopy,[Ⓢ] Physical property characterization,[Ⓢ] Solid-state synthesis,[Ⓢ] Python & Image processing[Ⓢ]

Publication record

- **Revealing antiferroelectric ordering in NaNbO_3 - SrSnO_3 from direct superlattice strain imaging**^{ⓈⓈⓈ}
Under review
- **Coupled local residual shear and compressive strain in NaNbO_3 ceramics under cooling**^{ⓈⓈⓈ}
Oliveira, L., Zhang, M. H., Höfling, M., Rodriguez-Lamas, R., Yildirim, C., Koruza, J., & Simons, H.
Acta Materialia, 266, 119640, 2024.
- **Electric-field-induced non-ergodic relaxor to ferroelectric transition in BiFeO_3 - $x\text{SrTiO}_3$ ceramics**^{ⓈⓈⓈ}
Themed as 2023 HOT Journal of Materials Chemistry C articles and Recent Open Access Articles
Oliveira, L., Ormstrup, J., Majkut, M., Makarovic, M., Rojac, T., Walker, J., & Simons, H.
Journal of Materials Chemistry C, 11(21), 6902-6911, 2023.
- **Piezoelectric properties of mechanochemically processed 0.67BiFeO_3 - 0.33BaTiO_3 ceramics**^{ⓈⓈⓈ}
Ferrero, G., Astafiev, K., Ringgaard, E., de Oliveira, L. S., Sudireddy, B. R., Haugen, A. B., & Rojac, T. (2023).
Journal of the European Ceramic Society, 43(2), 350-361, 2023.
- **Structural, thermal, vibrational, and optical characterization of Sn-S-Se dichalcogenide system synthesized by high-energy ball milling**[Ⓢ]
de Oliveira Melquiades, M., de Oliveira, L. S., da Silva, R. A., de Souza, S. M., & Orlandi, M. O.
Journal of Physics and Chemistry of Solids, 157, 110203, 2021.
- **Insulator-metal transition in the $\text{Nd}_2\text{CoFeO}_6$ disordered double perovskite**^{ⓈⓈⓈⓈⓈ}
de Oliveira, L. S., Sabino, F. P., de Florio, D. Z., Janotti, A., Dalpian, G. M., & Souza, J. A.
The Journal of Physical Chemistry C, 124(41), 22733-22742, 2020.
- **Thermal annealing influence on structural, magnetic, electronic, and mechanical properties of off-stoichiometric $\text{Ni}_{40}\text{Cu}_{10}\text{Mn}_{35}\text{Ti}_{15}$ all-d-metal Heusler alloy**^{ⓈⓈⓈ}
de Paula, V. G., de Oliveira, L. S., Mendes Filho, A. A., Rios, C. T., & Souza, J. A.
Journal of Materials Research, 35(21), 3004-3011, 2020.
- **Charge Transport in MAPbI_3 Pellets across the Tetragonal-to-Cubic Phase Transition: The Role of Grain Boundaries from Structural, Electrical, and Optical Characterizations**^{ⓈⓈⓈ}
Sombrio, G., Zhang, Z., Bonadio, A., de Oliveira, L. S., de Queiroz, T. B., Ferreira, F. F., & Souza, J. A.

The Journal of Physical Chemistry C, 124(20), 10793-10803, 2020.

- **Possible Charge-Transfer-Induced Conductivity Enhancement in TiO₂ Microtubes Decorated with Perovskite CsPbBr₃ Nanocrystals**^o
Gomez, C. M., Pan, S., Braga, H. M., de Oliveira, L. S., Dalpian, G. M., Biesold-McGee, G. V., & Souza, J. A. Langmuir, 36(19), 5408-5416, 2020.
- **Phase transformations in a NiTiGe system induced by high energy milling**^o
DE OLIVEIRA, Leonardo Soares et al.
Journal of Solid State Chemistry, v. 281, p. 121056, 2020.
- **Novel design of photocatalyst coaxial ferromagnetic core and semiconducting shell microwire architecture**^o
Sombrio, G., Pomar, C. A. D., de Oliveira, L. S., Freitas, A. L. M., Souza, F. L., & Souza, J. A. Journal of Catalysis, 370, 61-69, 2019.
- **Liquid water-induced growth of the 1D morphology of CH₃NH₃PbI₃ hybrid perovskites**^o
†Featured on the front cover of CrystEngComm
Bonadio, A., de Oliveira, L. S., Polo, A. S., & Souza, J. A. CrystEngComm, 21(48), 7365-7372, 2019.
- **Structural and optical properties of a mechanically alloyed thermoelectric lamellar SnSeS solid solution**^o
Melquíades, M. O., De Oliveira, L. S., Rebelo, Q. H. F. et al. Journal of Applied Physics, 126(13), 135707, 2019.

Conference talks

- Can residual stresses disrupt the energy storage functionality of antiferroelectric NaNbO₃ ceramics? New Opportunities in Diffraction Microscopy. ESRF, Grenoble, France, 2024.
- 3D Structure of Defects in Antiferroelectric NaNbO₃ Single Crystal
IEEE – International Symposium of Applications in Ferroelectrics (ISAF), Cleveland, Ohio, USA, 2023.
- In Situ Mapping of {100}_{pc} Residual Strains in NaNbO₃ Across Thermally Induced Phase Transitions. IMF – The 15th International meeting on Ferroelectricity. Tel Aviv, Israel, 2023.
- In situ Electric-Field-Induced Transition from Non-Ergodic Relaxor to Ferroelectric State in BiFeO₃-xSrTiO₃
IEEE – International Symposium of Applications in Ferroelectrics (ISAF) 2022. Tours, France, 2022.

Ongoing Collaborations

- Revealing deeply embedded defect pathways for efficient antiferroelectrics^{1,2}
† Original proposal granted by ESRF in 2023 at ID01 beamline
 - 3D structure of defects in antiferroelectric NaNbO₃ single crystal^{2,3}
 - Stabilizing reversible double hysteresis loops in NaNbO₃ for energy applications^{4,5}
 - *In-situ* calcination and texture formation of templated piezoceramics with *sub-second* time-resolution^{6,7}
- Partners: Xi'an Jiaotong University (China),¹ ESRF (France),² TU Darmstadt (Germany),³ TU Graz (Austria),⁴ The Pennsylvania State University (USA),⁵ MAX IV (Sweden),⁶ DTU Energy (Denmark)⁷

Teaching activities

Teaching assistance	Physics II	UEA	Amazonas, Brazil	2012
	Experiments in Physics III	UFAM	Amazonas, Brazil	2016
	Materials Characterization	UFABC	São Paulo, Brazil	2018
	Physics I	DTU	Kgs. Lyngby, Denmark	2021-2022
Lecturer	General Mechanics for Technicians	Literatus	Amazonas, Brazil	2016

Training Courses

FerroSchool (2022), Topas Academic (2019), 1st Brazilian Synchrotron School (2017), GSAS School (2016)

Languages

English (fluent), Portuguese (native)

References

Hugh Simons	A/Prof. at DTU, Department of Physics	husimo@fysik.dtu.dk
Astri Haugen	A/Prof. at DTU, Department of Energy Conversion and Storage	ahua@dtu.dk
Tadej Rojac	Prof. at Jožef Stefan Institute, Electronic Ceramics Department	tadej.rojac@ijs.si
Jurij Koruza	A/Prof. at TU Graz, Institute for Chemistry and Technology of Materials	jurij.koruza@tugraz.at