

# Hrishikesh Kamble, Ph.D. Scholar

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## Profile Summary

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■ Ph.D. candidate in Physics at the University of Zagreb and Research Assistant at Institut Ruđer Bošković, Croatia, with research experience in thin-film materials, optical spectroscopy, and nanostructured metal–dielectric systems. Skilled in spectroscopic ellipsometry, Raman and FTIR spectroscopy, SEM, SIMS, and optical modelling of thin films and nanostructures. Experienced in studying structure–property relationships in functional materials, including optical, vibrational, and diffusion-driven phenomena in dielectric and metallic thin films. International research experience at the University of Bordeaux, France. Interested in experimental condensed matter physics, thin-film optics, nanophotonics, and spectroscopy-based materials research.

## Education

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- 2022 – present    **Ph.D. in Physics, University of Zagreb (Faculty of Science).**
- Thesis: *Assisted solid state ion exchange for nanostructuring metal layers with optical losses in infrared range.*
  - Project: *Metal Composites for Ultra-Thin Infrared Coatings (METACUC).*
  - Mentor: [Dr. Vesna Janicki](#)
- 2017 – 2019    **M.Sc. in Physics, Ramnarain Ruia Autonomous College, Mumbai University.**
- CGPA: 9.04 / 10.00 (*Silver Medalist*).
  - Mentor: [Prof. Dr. Nana Pradhan](#)
- 2014 – 2017    **B.Sc. in Physics, Ramnarain Ruia Autonomous College, Mumbai University.**
- CGPA: 5.72 / 7.00.

## Professional Experience

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- 2022 – present    **Research Assistant, Institut Ruđer Bošković, Zagreb, Croatia.**
- Investigate optical and structural properties of metal–dielectric thin films for infrared applications.
  - Perform spectroscopic ellipsometry, Raman spectroscopy, FTIR, SEM, and SIMS for material characterisation.
  - Develop optical models (Drude + oscillator-based) to extract optical constants, and related parameters.
  - Study electric-field-assisted ion drift and its role in tuning optical response.
- Sep – Nov 2024    **Visiting Researcher, Institut des Sciences Moléculaires, University of Bordeaux, France.**
- Conducted FTIR and Raman spectroscopy on dielectric and metal–dielectric thin films.
  - Investigated electric-field-assisted diffusion (EFAD) and defect evolution in oxide systems.
  - Funded by a competitive HRZZ mobility scholarship (MOBDOK-2023-1623).
  - Mentor: [Dr. Marc Dussauze](#).
- 2020 – 2022    **Subject Matter Expert – Physics, Jaro Education, Mumbai, India.**
- Developed physics educational content; coordinated design, animation, and academic teams.
- 2019 – 2020    **Teaching Assistant, Ramnarain Ruia Autonomous College, Mumbai, India.**
- Conducted undergraduate lectures and laboratory sessions; supervised examinations.

## Research Projects

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- Oct 2022 – present    **Metal Composites for Ultra-Thin Infrared Coatings (METACUC) — Doctoral Thesis.**
- Study plasmonic metal thin films and tunable infrared optical coatings.
  - Investigate morphology–optical property relationships via spectroscopic ellipsometry.
  - PI: [Dr. Jordi Sancho-Parramon](#)
- Aug – Nov 2024    **Electric-Field-Assisted Structural Modification in Dielectrics — HRZZ MOBDOK-2023-1623.**
- International mobility project at Université de Bordeaux; Co-PI: Dr. Marc Dussauze.
  - FTIR / Raman study of defect evolution, hydroxyl reduction, and electric field-assisted metal drift in oxide thin-films.
- 2017 – 2019    **Noble-Gas Ions Implanted in Silicon Thin Films — M.Sc. Thesis.**
- Supervisor: Dr. Nana Pradhan.
- 2018 – 2019    **Oscillation Counter Based on Embedded Systems — M.Sc. Project.**
- 2015 – 2017    **Dilute Magnetic Semiconductors — B.Sc. Project.**
- Supervisor: Dr. Nana Pradhan.

## Skills

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|----------------------|---------------------------------------------------------------------------------------------|
| Experimental         | ■ Spectroscopic Ellipsometry, Raman Spectroscopy, FTIR, SEM, SIMS, thin-film deposition.    |
| Modelling & Analysis | ■ VASE, SRIM, OriginLab, MATLAB.                                                            |
| Programming          | ■ C, C++; $\LaTeX$ for scientific writing; MS Office.                                       |
| Languages            | ■ Marathi (native), Hindi (native), English (professional), Croatian (basic), Urdu (basic). |

## Publications

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- 1** Kamble, H., Sancho-Parramon, J., and Janicki, V. “Tuning the optical properties of Ag layers in the infrared region via thermally induced ion diffusion.” *Optical Materials* (2025): 117765. doi: [10.1016/j.optmat.2025.117765](#)  
*First-author study demonstrating thermally induced Ag ion diffusion as a route to tunable IR optical response in metal–dielectric coatings.*
- 2** Sancho-Parramon, J., Amochkina, T., Wilbrandt, S., Kamble, H., et al. “Optical Characterisation of Al Island Films: A Round Robin Test.” *Coatings* 13, no. 6 (2023): 1073. doi: [10.3390/coatings13061073](#)  
*Multi-lab benchmarking study of spectroscopic ellipsometry models for aluminium island films.*
- 3** Pradhan, N., Kamble, H. “Studies of Krypton implanted Silicon Materials at Low Energy ion beam for Electronic devices.” *Int. J. Industrial Electronics and Electrical Engineering*, Vol. 7, Dec. 2019. [ResearchGate](#)  
*M.Sc. thesis study on low-energy Kr implantation effects in silicon for device applications.*
- 4** Maru, A., Kamble, H., et al. “Mg doped ZnO dilute magnetic oxides prepared by chemical method.” *Int. J. Chem. Phys. Sci.* 5 (2020): 44–49. [ResearchGate](#)  
*B.Sc. project work on synthesis and characterisation of Mg-doped ZnO dilute magnetic oxide.*

## Manuscripts in Preparation

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- Structural and optical modifications in dielectric thin films under electric-field-assisted ion drift. (under review)
- Morphology tuning of metal thin films for infrared optical losses using electric-field-assisted dissolution. (in preparation)

## Conferences & Presentations

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- 2025 ■ Silver diffusion in TiO<sub>2</sub> thin films. **YUCOMAT 2025**, Montenegro. (*Oral*)
- 2025 ■ Crystallization in TiO<sub>2</sub> thin films. **Solid-State Science Meeting**, Zagreb. (*Oral*)
- 2025 ■ Structural and optical modifications in dielectric thin films. **PhD Symposium**, Zagreb. (*Oral*)
- 2024 ■ Plasmon coupling in Al island films. **Workshop on Optical Thin Films 2024**. (*Oral*)
- 2023 ■ Ion implantation in silicon thin films. **NANOTECHNOLOGY 2023**, Greece. (*Oral*)
- 2019 ■ Krypton implanted silicon materials. **National Conference**, Mumbai. (*Oral — Best Paper Award*)

## Awards & Achievements

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- 2025 ■ **HRZZ Mobility Scholarship** (MOBDOK-2023-1623), Croatian Science Foundation. Competitive international fellowship supporting three-month residency at Université de Bordeaux.
- 2019 ■ **Best Paper Award** — National Conference, Mumbai. Presentation on Krypton-implanted silicon materials.
- 2019 ■ **Silver Medal** (College level) in M.Sc. Physics, Ramnarain Ruia Autonomous College.

## Professional Service & Community

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- Member, Board of Studies – Dept. of Physics, Ramnarain Ruia Autonomous College, Mumbai.
- Representative of Assistants, Council of Physics – IRB Zagreb.
- Co-Organiser, Infinity Physics Symposium. Dept. of Physics, Ramnarain Ruia Autonomous College, Mumbai.

## Courses & Additional Training

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- Atomic, Molecular and Optical Physics. *University of Zagreb*
- Nanotechnology *Coursera*.
- Astronomy and Astrophysics, *University of Mumbai*.