

# RAKSHIT SENGHANI

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## PROFESSIONAL SUMMARY

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"Results-driven Process Development Engineer with expertise in laser-based material processing, wafer fabrication, thin-film deposition, and semiconductor physics; experienced in microstructuring, defect analysis, high-precision optical systems, and cross-functional collaboration for scalable solutions in semiconductor, photovoltaic, and AR glass technologies.."

## EDUCATION

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**Master Of Advanced Functional Materials** , Technische Universität Chemnitz

Apr 2025

- Specialized in Thin Films and Interfaces, Semiconductor Physics – Nanostructures, and Photovoltaics with Nanotechnology, developing strong analytical skills for evaluating material properties, optimizing device performance, and solving challenges in material science for both research and industrial applications.

**Bachelor of Engineering in Nanotechnology**, Gujarat Technological University, India

Oct 2016 - Oct 2020

- Focused on Nanophysics, Nanochemistry, Nanoelectronics, Solid-State Physics, Spintronics, and Nanomedicine, building a strong foundation in industrial nanotechnology and materials engineering at the nanoscale.

## EXPERIENCE

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**Master Thesis**, Process Development & Optimization , Chemnitz, Germany

Oct 2024 - Mar 2025

- Executed filamentation and thermal separation processes with integrated real-time thermal imaging, conducting over 2000 sample trials on BF33, soda-lime, and RealView 1.8 high-index glasses across varied laser parameters.
- Implemented straight-line and wave geometries to evaluate the influence of scan patterns on thermal stress distribution, separation behavior, and mechanical integrity.
- Investigated optical configurations and cutting profiles (grids, lines, freeform) to reduce chipping, micro-cracks, and heat-affected zones (HAZ), achieving high edge quality suitable for waveguide-compatible AR/VR applications.
- Defined and optimized process windows for each glass type by mapping laser power, scan speed, and beam size against separation outcomes—setting clear boundaries for partial separation, full clean separation, and damage zones, enabling repeatable, high-precision manufacturing in industrial settings.

**Research Project**, 3D Micromac, Chemnitz, Germany

Mar 2024 - Sept 2024

- Engineered and optimized advanced laser-based filamentation and separation methodologies for soda-lime glass, achieving high-precision cuts with minimal thermal distortion, utilizing state-of-the-art CO2 laser systems and meticulous process control.
- Devised and executed a two-step filamentation strategy to address limitations in full-depth processing of thick glass without relief cuts, ensuring homogeneity and structural integrity across the material thickness while mitigating thermal stresses.
- Leveraged liquid nitrogen-assisted cooling techniques to enhance the efficacy of the separation process in thicker glass samples, facilitating the attainment of clean self separations while minimizing residual internal stresses and mitigating crack propagation.

- Analyzed and correlated the processing parameters of soda-lime glass with microstructural changes and material behavior, focusing on the effects of varying contour radii and glass thickness in precision laser separation.

**Working Student – Application Engineer**, 3D-Micromac AG, Chemnitz, Germany

Apr 2023 - Mar 2024

- Executed laser dicing of SiC wafers and half-cell separation of PV modules using precise micromachining laser systems tailored for the semiconductor and energy industries, ensuring high precision and throughput.
- Performed CFRP micromachining using ultrashort pulse lasers, and operated CO<sub>2</sub> and UV laser systems for thermal laser separation (TLS) and micromarking on substrates like glass, polymers, and silicon—optimizing edge quality, delamination resistance, and process compatibility.
- Delivered contract manufacturing solutions for clients in semiconductor, photovoltaic, aerospace, and advanced materials sectors by fine-tuning laser parameters (Eg. pulse energy, scan speed, frequency) for each application.
- Worked in ISO-class cleanroom environments for wafer and substrate handling; supported optical inspections, thermal profiling, and dimensional checks, while contributing to defect analysis, inventory management, equipment maintenance, and maintaining custom workflow setups for client-specific manufacturing processes..

**Research Study** , TU Chemnitz & Helmholtz-Zentrum Dresden-Rossendorf (HZDR)

Oct 2023 - March 2024

- Fabricated PMA multilayer stacks using DC magnetron sputtering for stripe domain alignment in spintronic devices and Conducted domain and material analysis using XRD, VSM, and MFM to evaluate in-plane anisotropy and remanent behavior.
- Correlated deposition conditions with magnetic domain orientation and anisotropic performance. Gained hands-on expertise in thin-film growth, atomic layer deposition, magnetic property evaluation, and MFM data analysis using Gwyddion.

## TECHNICAL SKILLS

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- **Laser Processing:** Ultrashort pulse micromachining, thermal laser separation (TLS), SiC and PV wafer dicing, CFRP cutting, AR glass separation (BF33, RealView 1.8, soda-lime), laser marking and patterning, 3DmicroMMI, VBScript scan automation, optical alignment
- **Synthesis Techniques:** DC sputtering, thin-film deposition, Co-precipitation, wet chemical, ultrasonication assisted dispersion, surface functionalization , nanoparticle impregnation on porous substrates, surfactant-assisted stabilization, CVD, PVD, and ALD.
- **Characterization Techniques:** XRD, XRR, VSM, MFM, AFM, FTIR, UV-Vis spectroscopy, optical microscopy (Nikon, Leica, Keyence), thermal imaging and four-point bending tests.
- **Software Simulation:** COMSOL Multiphysics, MATLAB, LabVIEW, OriginLab, Gwyddion, Microsoft Office Suite, LaTeX, Quartus prime, Tableau.
- **Lab Process Skills:** Cleanroom handling (ISO class), glovebox operation, experiment planning, defect analysis, process optimization, DOE, equipment maintenance, contract manufacturing support

## MAIN EMPHASIS

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- Laser-Based Material and Semiconductor wafer processing.
- Thin-Film, Spintronics, and Industrial Nanotechnology

## LANGUAGES

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- **English(C1):** Business fluent
- **German(B1):** Intermediate
- **Gujarati and Hindi(C2):** Native languages