

Ivan Kashuba

CURRICULUM
VITAE
Türkiye

Research Engineer & R&D Chemist

Materials Science | Polymers & Coatings | Photonics | Process Engineering | Scientific Data Workflows

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PROFESSIONAL PROFILE

Research engineer and chemist-technologist with 10+ years of laboratory, R&D and production experience in silver-halide single crystals and infrared light guides, optical coatings, glycolide monomer manufacturing and powder coatings. Combines hands-on experimentation and equipment commissioning with instrument-data interpretation, process troubleshooting, engineering calculations and technical documentation. Current independent work focuses on reproducible Python models, laboratory document automation and computational chemistry and bioinformatics foundations.

RESEARCH AND TECHNICAL FOCUS

Materials and process R&D Single crystals, infrared light guides, polymers, powder and optical coatings, glycolide, thermal-vacuum processing and extrusion.	Experimental analysis and troubleshooting Instrument data, process parameters and material condition used for root-cause analysis, corrective action and reproducible procedures.
Scientific data and engineering calculations Excel and Python models, CSV/JSON workflows, plotting, validation checks, literature-based calculations and technical reporting.	Laboratory automation and digital R&D Git/GitHub, FastAPI and UiPath workflows, deterministic specification checks, human-review routing and AI-assisted technical work.

PROFESSIONAL EXPERIENCE

Independent Research, Engineering Modelling & Professional Development | Independent R&D

Feb 2025 - Present

Türkiye

- Conduct independent literature research and maintain a public GitHub portfolio in materials, polymers, coatings, monomer processes and scientific data workflows.
- Convert selected chemical-engineering calculations from Excel into reproducible Python models with configurable inputs, validation checks, CSV outputs and plots.
- Develop and document an AI Laboratory Document Automation project combining FastAPI, SQLite, UiPath C# workflows and deterministic PASS/REVIEW/FAIL logic while strengthening version control and technical writing.

Research Engineer - Powder Coatings Laboratory Setup & Process Improvement | Institute for Applied Chemistry and Certification FRISHBERG Ltd.

Jul 2024 - Jan 2025

Yekaterinburg, Russia

- Helped establish and develop a powder-coatings R&D laboratory by transferring, positioning, connecting and commissioning selected production equipment for laboratory use.
- Investigated replacement components and alternative formulations through gel-time measurements, DSC with nitrogen cooling, NMR-solvent selection and laboratory coating trials.
- Processed and visualised Excel data for component content, gel time, powder humidity, cathodic-disbondment diameter, material quantities and correlation screening.
- Improved temperature control and powder quality by inspecting and cleaning a liquid heat exchanger, addressing micronisation cleanliness, improving storage sealing and increasing mixture homogeneity through grinding and sieving.
- Applied tribostatic powder spraying to heated test specimens; produced approximately 30 kg of experimental coating batches and assessed adhesion and cathodic disbondment.

Chemist-Technologist - Glycolide Monomer Manufacturing & Process**Improvement | Medin-N****Aug 2021 - Apr 2024***Yekaterinburg, Russia*

- Maintained technical process documentation and process sheets for glycolide (1,4-dioxane-2,5-dione) synthesis, purification, filtration and thermal-vacuum operations used in biodegradable polymer production.
- Investigated quality deviations related to raw-material dehydration, storage-associated oxidation, filtration and thermal-vacuum processing; identified ineffective dehydration and supported installation of an improved drying cabinet.
- Defined practical temperature ranges for thermal-vacuum synthesis and distillation and improved filtration by insulating the filter element, reducing overheating and unintended oligomer dissolution.
- Contributed to production of approximately 600 kg of monomer for biodegradable polymer applications.
- Reduced preparation time for a heat-crosslinking polymer-dye protective solution from approximately two weeks to a few hours through grinding, heating and controlled mixing.
- Performed ^1H NMR analysis and identified rapid moisture-associated monomer oligomerisation; co-developed a microwave synthesis and vacuum-distillation setup for university project work.

Process Engineer - Optical Coatings | ODV Prescription Optics Plant**Apr 2021 - Jul 2021***Yekaterinburg, Russia*

- Supported washing, surface activation and adhesion processes for polymer ophthalmic lenses and optical interference coatings.
- Transferred an interference-coating process to new low-pressure electron-beam deposition equipment.
- Measured polymer moisture content and coating transmission spectra; maintained Excel process logs and investigated coating defects using microscopy, humidity, temperature and equipment operating parameters.
- Removed hardened flaking polymer contamination from the finishing area and supported rapid corrective action during production.

Research Engineer - Fiber Technology & Photonics | Fiber Technology and Photonics Laboratory**Jan 2013 - Jul 2021***Yekaterinburg, Russia*

- Worked in the laboratory where specialist-degree and postgraduate research in infrared light guides, single-crystal materials and photonics was completed.
- Played a key hands-on role in a team that developed and implemented a flexible PMMA light-guide neonatal phototherapy lamp for treatment of hyperbilirubinaemia in premature infants.
- Proposed automated laser engraving of PMMA light guides to create controlled side emission and identified suitable equipment suppliers.
- Co-assembled an LED UV-curing unit for rapid connector fixation; machined connectors and attachment components and supported infrared light-guide processing and extrusion work.
- Prepared a detailed written workflow for a substantial part of lamp production and assembly and participated in volunteer projects supporting children in orphanages.

SELECTED CONTRIBUTIONS ACROSS ROLES**Process improvement**

Drying, filtration, temperature control, micronisation cleanliness, storage sealing and workflow standardisation.

Equipment and prototyping

Laboratory commissioning, extrusion tooling, tubular furnace construction, UV-curing unit assembly and prototype manufacture.

Data and documentation

Excel analysis, instrument-data interpretation, process sheets, production procedures, GitHub documentation and reproducible calculations.

EDUCATION AND ACADEMIC TRAINING

Completed Postgraduate Programme in Chemical Sciences | Ural Federal University

2015 - 2019

Institute of Chemical Engineering | GPA 4.4/5.0

- Diploma qualification awarded: "Researcher; Teacher-Researcher."
- Research topic: "Research and Development of Photonic-Crystal Light Guides for a Wide Infrared Spectral Range."
- Refined the AgBr-AgI phase diagram using differential thermal analysis and investigated compositions intended for single-mode infrared light guides with a wider transmission range.
- Worked with thermozone crystallisation and Bridgman-Stockbarger crystal growth; machined single crystals in a glove box and hot-extruded them into infrared light guides.
- Designed extrusion tooling in KOMPAS-3D, reviewed ANSYS structural-stress results prepared with a simulation specialist, and calculated and built a tubular furnace for heating extrusion tooling.

Specialist Degree in Chemical Technology | Ural Federal University

2010 - 2015

Institute of Chemical Engineering | GPA 4.4/5.0

- Specialisation: Chemical Technology of Single Crystals, Materials and Electronic Products.
- Graduation research: "Study of Extrusion Modes of Infrared Light Guides Based on Silver-Halide Single Crystals."
- Investigated production and hot-extrusion conditions for two-component silver-halide infrared light guides, including crystal machining, tooling strength and optical-quality evaluation.
- Designed and tested extrusion tooling and calculated a tubular furnace integrated with a Shimadzu AGS-X testing machine for hot extrusion.

Professional Retraining Diploma - Enterprise Economics and Management | Ural Federal University Business School

2012 - 2015

Yekaterinburg, Russia

- Coursework included profitability and cost calculations for a small-scale scientific production process, business planning, operations management and industrial decision-making.

Additional University Studies - Resource-Saving Technologies and Biotechnology | Ural Federal University

2023 - 2024

Programme not completed because of international relocation

- Completed practical coursework in NMR interpretation, chromatographic and spectroscopic methods, molecular docking, protein-ligand interaction analysis, phylogenetic analysis and Excel-based process scale-up equations.
- Studied introductory Python data workflows and literature-based design of a microwave reactor for monomer synthesis and vacuum distillation.
- Tools studied included PyMOL, AutoDockTools, Open Babel, ProteinsPlus, SwissTargetPrediction, RCSB PDB, NCBI and PubMed.

RESEARCH THEMES DEVELOPED DURING EDUCATION

Infrared optical materials: Silver-halide crystals, solid solutions, phase diagrams, wide-band infrared transmission, single-mode and microstructured light guides.

Crystal growth and processing: Thermozone crystallisation, Bridgman-Stockbarger growth, glove-box machining, hot extrusion and tooling/furnace design.

Chemical process engineering: Thermal-vacuum synthesis, distillation, filtration, drying, similarity criteria, scale-up calculations and process troubleshooting.

Biomedical and computational applications: Laser-surgery light guides, neonatal phototherapy, biodegradable polymers, molecular docking and literature-driven hypothesis development.

SELECTED RESEARCH AND ENGINEERING PROJECTS

Digital and reproducible engineering portfolio - Public repositories are documented for reproducibility. The calculation projects are educational/theoretical models and are not substitutes for validated industrial design calculations.

AI Laboratory Document Automation [UiPath](#) | [FastAPI](#) | [SQLite](#) | [C#](#) | [Python](#) [Project link](#)

- Built a portfolio MVP that extracts structured values from laboratory documents, validates them against configurable specifications and returns deterministic PASS, REVIEW or FAIL decisions.
- Implemented a FastAPI service, SQLite audit history, CSV export, automated tests and UiPath C# workflows for passing, incomplete and out-of-specification scenarios.
- Designed human-in-the-loop routing so low-confidence, incomplete or out-of-specification results require review; an LLM may summarise results but cannot change the rule-engine decision.

Reactor Dissolution Calculation [Mass transfer](#) | [Mixing](#) | [Energy](#) [Project link](#)

- Parameter-driven Python model for agitator-speed scenarios, mass transfer, dissolution time, motor-capacity limits and energy indicators.
- Baseline outputs were checked against the source Excel calculation and documented with configurable inputs and plots.

Pneumatic Dryer Performance Calculator [Heat and mass transfer](#) | [Pressure drop](#) [Project link](#)

- Evaluates gas velocity, tube diameter, heat transfer, drying time, required pipe length and pressure drop over a configurable operating range.
- Produces structured CSV outputs and visualisations for scenario comparison.

Stirred-Vessel Heating Comparator [Agitation](#) | [Heat transfer](#) [Project link](#)

- Compares paddle, anchor and propeller impellers across rotational-speed ranges, predicted heat-transfer performance, heating time and diminishing-return behaviour.
- Baseline results were checked against the source spreadsheet and documented as a reproducible workflow.

Tube-in-Tube Heat Exchanger Scaling Model [Scale-up](#) | [Similarity criteria](#) [Project link](#)

- Converts an Excel-based milk-heating calculation into a parameter-driven Python workflow with criteria-based flow screening and improved heat-transfer assumptions.
- Uses validation and explicit limitations to separate coursework reproduction from engineering design claims.

EXPERIMENTAL AND PRODUCT DEVELOPMENT PROJECTS

Flexible Neonatal Phototherapy Lamp [Medical device development](#) | [PMMA light guides](#)

- Contributed practical manufacturing and process-development work to a flexible side-emitting PMMA light-guide lamp for neonatal phototherapy.
- Proposed laser engraving for controlled side emission, identified equipment suppliers, co-assembled a UV-curing unit, machined connectors and documented assembly procedures.

Microwave Synthesis and Vacuum-Distillation Setup [Monomer synthesis](#) | [Literature-based design](#)

- Co-developed a laboratory setup for microwave-assisted synthesis and vacuum distillation during university project work conducted in collaboration with the monomer laboratory.
- Selected heating media and process concepts through literature review; ^1H NMR was used to investigate moisture-associated glycolide oligomerisation.

SELECTED PUBLICATIONS AND CONFERENCE CONTRIBUTIONS

1. Korsakova, E. A.; L'vov, A. E.; **Kashuba, I. A.**; Korsakov, V. S.; Salimgareev, D. D.; Korsakov, A. S.; Zhukova, L. V. "Fiber-Optic Assemblies Based on Polycrystalline Lightguides for the Mid-IR." Journal of Optical Technology 86(7), 439-445 (2019). [doi: 10.1364/JOT.86.000439](https://doi.org/10.1364/JOT.86.000439)
2. Korsakova, E.; **Kashuba, I.**; Korsakov, A.; Doroganov, S.; Skvortsov, D.; Kalintseva, N.; Zhukova, L. "Laser Systems Supplied with Silver Halide Fibres for Laser-Surgery Angioplasty." Proceedings of the 2019 Ural Symposium on Biomedical Engineering, Radioelectronics and Information Technology (USBREIT), 2019. [doi: 10.1109/USBREIT.2019.8736633](https://doi.org/10.1109/USBREIT.2019.8736633)
3. Salimgareev, D. D.; L'vov, A. E.; Korsakov, V. S.; Gul'ko, D. Y.; **Kashuba, I. A.**; Korsakov, A. S.; Zhukova, L. V. "β-Radiation-Resistant Optical Fibers Based on Modified Silver Halide Crystals." Materials of Nano-, Micro-, Optoelectronics and Fiber Optics: Physical Properties and Applications, 17th International Scientific Conference-School, Saransk, 2018, p. 40.

Research profiles: [ORCID 0009-0002-8976-8886](https://orcid.org/0009-0002-8976-8886) | [Ural Federal University publications profile](#)

TECHNICAL METHODS AND EQUIPMENT

Materials and processes	Silver-halide single crystals; thermozone crystallisation; Bridgman-Stockbarger growth; glove-box machining; hot extrusion; powder-coating formulation and application; glycolide synthesis; thermal-vacuum processing and distillation; filtration; drying; vacuum deposition; optical-surface cleaning and adhesion; micronisation.
Analytical methods	Hands-on use and/or interpretation: ¹ H NMR, DSC, DTA, TGA, FTIR, UV-Vis/spectrophotometry, microscopy, moisture, pH, conductivity and thickness measurements. Introductory training: ¹³ C NMR, HSQC, HMBC, TLC, HPLC, LC-MS, GC-MS and UPLC.
Equipment	DSC with nitrogen cooling; thermal-vacuum reactors and vacuum systems; electron-beam deposition equipment; powder-coating and micronisation equipment; extrusion tooling and testing machine; CO ₂ laser; UV-curing equipment; microwave reactor; ultrasonic bath; centrifuge; laboratory drying, grinding and heating equipment.
Quality and test work	Gel-time measurement; cathodic-disbondment evaluation; adhesion and coating trials; spectral-transmission measurement; experimental batch preparation; process-deviation investigation; procedure development and technical documentation.

SOFTWARE, RESEARCH TOOLS AND DIGITAL SKILLS

Established use	Microsoft Excel; Origin; MestReNova; ChemDraw; Chem3D; KOMPAS-3D; Microsoft Office; Google Workspace; scientific literature search; technical documentation and presentation development.
Developing use	Python and Google Colab for engineering calculations, data processing and visualisation; Git and GitHub; JSON/CSV workflows; UiPath Studio; FastAPI; SQLite; AI-assisted coding, research and documentation workflows.
Research databases and modelling	Reaxys; Google Scholar; PubMed and NCBI; RCSB PDB; ProteinsPlus; PyMOL; AutoDockTools; Open Babel; SwissTargetPrediction. ANSYS: review and interpretation of structural-analysis results rather than independent expert-level simulation.

LANGUAGES

Russian - Native | English - B2, professional working proficiency

Personal website: ivan-kashuba-rd.github.io | Full project portfolio and current contact details