

Dr. Maria Kalashnikova, D.Sc.

Doctor of Technical Sciences · Extractive Metallurgy

Independent Metallurgy Consultant | Technical Due Diligence & Feasibility Review for Investment Funds & EPCM | Hydrometallurgical Flowsheet Design, Optimization & Commissioning

Tel Aviv District, Israel (Global / Remote) | maria@mkalashnikova.com | +972 55-284-2590

ORCID: 0009-0007-0247-4073 | LinkedIn: [dr-maria-kalashnikova](#) | Google Scholar: [aL4T18cAAAAJ](#)

| mkalashnikova.com



EXECUTIVE SUMMARY

Forty years of bench-to-plant practice in hydrometallurgy of base and precious metals. Designed and audited the processing of nickel sulphide and laterite ores at **12+ industrial sites and projects** across Russia, Finland, Australia, Guatemala, Bulgaria and Kazakhstan; independent contract-based consultant since 2014, working in parallel as Head of the Hydrometallurgy Laboratory at the Gipronickel Institute (St. Petersburg) until January 2025, when I concluded that role to consult full-time.

Independent technical review at the depth required for **NI 43-101 / JORC reporting standards**; supporting Qualified Person / Competent Person sign-off on metallurgical test-work, recovery projections, and process plant design. Author of **11 issued Russian Federation patents**, **1 registered APC software IP (2025)**, and **3 industry reference books**. No current employment, equity, or contractual obligations with any mining operator.

EDUCATION

D.Sc., Peter the Great St. Petersburg Polytechnic University, 2007 · **Cand.Sc. (PhD)**, St. Petersburg Mining Institute, 1994 · **Dipl.-Eng. in Non-Ferrous Metallurgy**, Leningrad Mining Institute (now St. Petersburg Mining University), 1985

AREAS OF EXPERTISE

- ▶ HPAL (high-pressure acid leaching)
- ▶ Atmospheric leaching
- ▶ Matte conversion
- ▶ Nickel sulphide flotation
- ▶ Sulfide precipitation
- ▶ Pyrrhotite-pentlandite concentrates
- ▶ Nickel laterite scoping-study review
- ▶ Technical due diligence
- ▶ APC (advanced process control) for hydromet
- ▶ POX (pressure oxidation)
- ▶ Laterite leaching
- ▶ Copper-nickel matte leaching
- ▶ Cobalt SX / EW
- ▶ PGM recovery
- ▶ Pb-Zn hydrometallurgy
- ▶ Flowsheet audit
- ▶ Process debottlenecking
- ▶ Independent technical review to NI 43-101 / JORC reporting standards

SELECTED PROJECTS (INDEPENDENT REVIEWER / LEAD PROCESS TECHNOLOGIST / SME)

2014–2015 · Fenix Nickel Project (HPAL route evaluation) · Guatemala ·

Independent Technical Reviewer — engaged under consulting contract (client confidential)

Nickel-laterite scoping-study audit for route selection, ~\$500M CAPEX scope

Independent audit of the Hatch nickel-laterite scoping study (2014–2015, study completed 2015; ~\$500M CAPEX scope), including review of SGS metallurgical test-work campaigns (2008 and 2013) and benchmarking against international best practice for laterite hydrometallurgical processing. Stress-tested acid-consumption, recovery and scaling assumptions; surfaced 6 critical operational and commercial risks — Magnesia Recovery, Residue Stability, Ocean Outfall Pipeline, Scaling of the Ocean Outfall Pipeline, Power Plant Availability, Cost of Sulphur. Findings informed the owner's decision not to advance the HPAL route to feasibility.

2008–2015 · Nor Nickel Harjavalta (Finland) & Norilsk Nickel Polar Division · **Lead Process Technologist**

Autoclave refining of copper-nickel matte in sulfate media — process-option development

Developed and evaluated process options for autoclave (pressure) refining of copper-nickel matte in sulfate media across multiple engagements for the Harjavalta refinery (Finland) and the Polar Division — technical reports and process recommendations supporting refinery flowsheet decisions.

2006–2010 · BHP Billiton · Australia · **SME — Precipitation Advisory**

Non-toxic Cu / Ni / Co sulfide precipitation from Ni-Co laterite leach solutions

Architected the technical case and evaluated alternative flowsheets for non-toxic sulfide precipitation — multiple comparative options delivered to cut reagent toxicity and downstream tailings load. Underlying authored method: patent RU 2328537.

2000–2002 · Kola MMC (Norilsk Nickel) · Russia · **Lead Process Technologist**

Roasting–Leaching–Electrowinning circuit — R&D-to-industrial roll-out, commissioned 2000–2002

Spearheaded scale-up of the matte-separation flowsheet for the Kola MMC refinery; optimised downstream matte conversion across nominal high-grade nickel production variants ranging 125,000–170,000 tpa. The industrial unit remained in continuous operation for ~20 years.

2014–2023 · Kola MMC (Norilsk Nickel) · Russia · **Lead Process Technologist**

Chloride-based refining of nickel-concentrate calcine — premium-grade cathode nickel & cobalt

Led a nine-year development and industrial-implementation programme for the chloride processing route of nickel-concentrate calcine from matte separation, producing premium-grade cathode nickel and cobalt, with subsequent optimisation and stabilisation of the industrial circuit through 2023. Patent RU 2789528; the route's iron-removal stage later became the basis of the registered APC algorithm (Certificate № 2025665318).

2005–2018 · Norilsk Nickel · Russia · **Lead Inventor & Process Technologist**

Pyrrhotite-pentlandite pressure-leaching flowsheet — base & PGM recovery

Developed and patented an advanced pressure-leaching flowsheet for complex pyrrhotite-pentlandite concentrates (previously a tailings stream) — unlocking a 10–25% increase in base-metal recovery and a 15–30% boost in PGM extraction depending on feed composition. Basis of patents RU 2114195 · RU 2573306 · RU 2626257 · RU 2712160.

2000–2015 · Laterites & Pb-Zn concentrates · Bulgaria, Kazakhstan (Zhaimem) · **Independent Technical Reviewer**

Custom leach profiles for ultra-low-grade Bulgarian laterites (<0.5% Ni) and complex Pb-Zn concentrates

Demonstrated the technical and economic limits of traditional pyrometallurgical processing for these specific ores. Findings prevented uneconomic capital commitments and guided strategic project-development decisions.

2000–2003 / 2010–2025 · Kola MMC · Russia · **Lead Process Technologist**

Magnetic-fraction processing — two development phases (sulfate then chloride media)

2000–2003: designed and commissioned an industrial unit for hydrometallurgical processing of fine-matte magnetic fraction in sulfate media. 2010–2025: developed process options for production of precious-metals concentrates from the magnetic fraction in chloride media — patent RU 2444573.

2024–2025 · APC algorithm for iron removal · **Co-developer & Co-author**

Real-time mathematical algorithm for iron-removal control in nickel-solution refining

Co-developed and registered a proprietary mathematical algorithm calculating real-time control actions for the iron-removal stage in nickel-solution purification, minimising base-metal losses — State Registration Certificate № 2025665318 (16 June 2025).

PATENTS & SOFTWARE IP — 11 ISSUED RU PATENTS + 1 SOFTWARE REGISTRATION

RU 2114195	Method of processing sulfide pyrrhotite-containing raw materials	1998
RU 2167101	Method of producing thiosulphates	2001
RU 2182183	Method of precipitating non-ferrous metals from solutions	2002
RU 2328537	Method of selective precipitation of nickel, cobalt and copper from zinc in sulfate solutions in the form of sulfides	2008
RU 2319754	Method of processing materials containing minerals in which nickel is in the oxide form	2008
RU 2444573	Method for producing precious metals concentrate from sulfide copper-nickel raw materials	2012
RU 2573306	Method of processing sulfide pyrrhotite-pentlandite concentrates containing precious metals	2016
RU 2601722	Method of processing solutions containing non-ferrous metals	2016
RU 2626257	Method of processing sulfide pyrrhotite-pentlandite concentrates containing precious metals	2017
RU 2712160	Method of processing sulfide concentrate containing pyrrhotite, pyrite, chalcopyrite, pentlandite, and precious metals	2020
RU 2789528	Method of processing precious-metals-bearing middlings from cathode nickel production (variants)	2023

Software IP — № 2025665318 · Klimenko I.V., Greyver M.B., Kalashnikova M.I., Abramova U.V. *Method of Calculating Control Actions for Purification of Nickel Solution from Iron — APC Algorithm*. State Registration Certificate, Russian Federation, registered 16 June 2025.

BOOKS

1. Naboychenko S.S., Shneerson Ya.M., Kalashnikova M.I., Chugaev L.V. *Pressure Hydrometallurgy of Non-Ferrous Metals, Vol. 1*. UGTU-UIPI, Yekaterinburg, 2008 (376 pp.).
2. Naboychenko S.S., Shneerson Ya.M., Kalashnikova M.I., Chugaev L.V. *Pressure Hydrometallurgy of Non-Ferrous Metals, Vol. 2*. UGTU-UIPI, Yekaterinburg, 2009 (612 pp.).
3. Kalashnikova M.I. *Scientific Basics of Modern Nickel and Copper Hydrometallurgy*. LAP LAMBERT Academic Publishing, 2011 (368 pp.).

SELECTED PEER-REVIEWED & SYMPOSIUM PAPERS

1. Klimenko I.V., Greyver M.B., Kalashnikova M.I., Vostrikova N.M. *Influence of Various Factors on Iron Oxidation in Highly Concentrated Chloride Nickel Solutions*. *Tsvetnye Metally (Non-Ferrous Metals)*, 2024, №10, pp. 47–54.
2. Kalashnikova M.I., Tsybulov L.B., Naboychenko S.S., Kolmachikhina O.B. *Promising Directions for the Processing of Oxidized Nickel Ores (Laterites) Applicable to Ural Deposits*. *Tsvetnye Metally (Non-Ferrous Metals)*, 2019, №8, pp. 4–10.
3. Petrov G.V., Kalashnikova M.I., Fokina S.B. *Regularities of Selenium and Chromium Behavior in Redox Processes During Hydrometallurgical Treatment of Solid-Phase Products of Rhenium Extraction*. *Notes of the Mining Institute (PMI)*, 2016, Vol. 220, pp. 601–606.
4. Saltykov P.M., Kalashnikova M.I., Saltykova E.G., Trubina O.A., Kotukhov S.B. *Hydrometallurgical processing of nickel sulphide concentrates from Australian deposits*. *Tsvetnye Metally (Non-Ferrous Metals)*, 2014, №9, pp. 68–75.
5. Sizyakov V.M., Dubovikov O.A., Nikolaeva N.V., Kalashnikova M.I. *The role of mineralized additives in the alumina phase transformation process*. *Journal of Mining Institute*, 2013, Vol. 202, pp. 48–55.
6. Volkov L.V., Kalashnikova M.I., Shneerson Ya.M. *The behaviour of copper during the dissolution of metallic nickel in CuSO₄ solutions*. *Copper / Cobre 2007*, John E. Dutrizac Symposium on Copper Hydrometallurgy, Toronto, Canada, 2007, pp. 333–343.
7. Kalashnikova M.I., Shneerson Ya.M., Keskinova M.V., Chetvertakov V.V. *Non-Traditional Methods of Heavy Metals Precipitation from Solution in the Form of Sulfide*. *Sohn International Symposium*, San Diego, USA, 2006, pp. 555–561.
8. Kalashnikova M.I., Shneerson Ya.M., Keskinova M.V. *Interactions of ferriferous copper-nickel mattes with sulphuric acid: study of chemistry and kinetics*. *Pressure Hydrometallurgy 2004*, Alberta, Canada, 2004, pp. 887–898.

Full master list (3 books + 18 papers) available in [Kalashnikova_Selected_Publications_2026.pdf](#) and at mkalashnikova.com/publications.

CONSULTATIVE & ADVISORY ROLES

Subject Matter Expert (SME) & Technical Advisor

High-level metallurgical strategy for global EPCM firms and mining operators on a contract basis — never as a permanent employee of any single operator.

Independent Reviewer

Auditing feasibility studies, scoping studies, and metallurgical test-work programs to ensure compliance with international financing standards.

Expert Competence

Independent technical review at the depth required for QP/CP-level reporting (metallurgical test-work, recovery projections, process plant design) under NI 43-101 / JORC reporting standards.