



Scientific Researcher

ARNOUX ROSSOUW

PhD | MSc | BEng

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PROFESSIONAL PROFILE

Engineer | Materials Scientist | Researcher | Strategic Leader

Dr. Arnoux Rossouw is an accomplished engineer, materials scientist, and research leader with over a decade of experience in **advanced materials research, surface science, and strategic project management**. His expertise spans **physical vapor deposition, thin-film materials engineering, track-etched membranes, and radiation safety**, with applications in **water treatment, energy materials, and biomedical technologies**.

Currently serving as the **Head of the National Group of South Africa at the Joint Institute for Nuclear Research (JINR)**, Dr. Rossouw plays a pivotal role in **expanding international research collaborations, securing funding, and advancing South African participation in nuclear research**. Under his leadership, JINR-South Africa projects have doubled.

Dr. Rossouw's research is rooted in **surface and interface science**, particularly the **modification of polymer track-etched membranes** through **planar magnetron sputtering**, a topic central to his **PhD in Electrical Engineering**. His expertise includes:

- **Advanced Materials & Nanotechnology:** Thin-film engineering, hybrid materials, and surface modification for applications in **photocatalysis, solid-state electrolytes, and biomedical sensing**.
- **Radiation Safety & Nuclear Science:** Managing **radiation safety projects**, overseeing **facility decommissioning**, and ensuring **regulatory compliance in controlled environments**.
- **High-Throughput Experimentation & Combinatorial Synthesis:** Developing **automated data analysis techniques** for large-scale experimental design.
- **Project & Strategic Leadership:** Managing **multi-institutional projects**, securing research grants, and **mentoring students and young researchers**.

His international experience includes research and development roles in **South Africa, Russia, Europe and North America**, where he has been instrumental in **collaborator development, event organization, and stakeholder engagement**. As a co-organizer of the **International African Symposium on Exotic Nuclei (IASEN-2024)**, he has contributed to strengthening global scientific partnerships.

With an extensive **publication record** in **high-impact journals**, numerous **academic awards**, and invitations to present at **prestigious international conferences**, Dr. Rossouw is committed to driving **cutting-edge innovation, fostering global research collaboration, and shaping the future of materials science and nuclear technology**.

KEY CAREER HIGHLIGHTS

- **Rossouw, A.** (2015). Award of Excellence for Research and Presentation. Dubna: Issued by Professor Marina Frontasyeva, 4th South African - JINR Symposium.
- **Rossouw, A.** (2014). Top 100 Young Specialists. Ulyanovsk: Russian Reporter Magazine, RUSNANO Foundation for Infrastructure and Educational Projects.
- **Member to numerous projects:**
 - o Functional polymer nanofibers immobilized on a track membrane surface for application in separation technologies | Served as Project Manager, Researcher, and Grant Writer.
 - o Investigation of Supercapacitor-Battery Hybrid Devices | Served as Lead Process Engineer and responsible for patent writing.
 - o Thin-film development of LIPON, WOx, VOx, and ITO for Electrochromic Applications | Served as Lead Process Engineer.
 - o Modification of Si nanocrystallites in SiO2 matrix by swift heavy ion irradiation | Served as Researcher.
 - o Design and manufacture of a Liquid Scintillation Detector | Served as CAD designer.
- **International Training in Thin-Film Development** Completed a 6-month intensive training in High Productivity Combinatorial techniques for accelerated thin-film development and optimization at Intermolecular Inc., San Jose, California.

AREAS OF EXPERTISE

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| <ul style="list-style-type: none"> - <i>Project Management</i> - <i>Research & Development</i> - <i>Surface Modification</i> - <i>Physical Vapour Disposition</i> - <i>Value-Added Engineering</i> - <i>Student Supervision</i> - <i>Process Improvement</i> - <i>Equipment Maintenance</i> - <i>Sputter Disposition</i> - <i>Thin Film Coating</i> - <i>Thermal Evaporation</i> - <i>Nanotechnology</i> - <i>Pulsed Labour Disposition</i> - <i>Stakeholder Relations</i> - <i>Laboratory Management</i> - <i>Equipment Maintenance</i> - <i>Deposition Techniques</i> <ul style="list-style-type: none"> o <i>Magnetron Sputtering</i> o <i>Reactive sputtering</i> o <i>Thermal Evaporation</i> o <i>PVD</i> | <ul style="list-style-type: none"> - <i>Fabrication Techniques</i> <ul style="list-style-type: none"> o <i>Laser Lithography</i> o <i>Vapour Liquid Solid</i> o <i>UV Lithography</i> o <i>Plasma Etching</i> - <i>Software and Simulation</i> <ul style="list-style-type: none"> o <i>MATLAB</i> o <i>Autodesk Inventor</i> o <i>JMP</i> o <i>LaTeX</i> - <i>Characterisation Techniques, Instrumentation & Testing</i> <ul style="list-style-type: none"> o <i>UV-Vis Spectroscopy</i> o <i>Scanning Electron Microscopy</i> o <i>Scanning Tunnelling Microscopy</i> o <i>Transmission Electron Microscopy</i> o <i>Spectroscopic Ellipsometry</i> | <ul style="list-style-type: none"> o <i>Light Microscopy</i> o <i>Atomic Force Microscopy</i> o <i>Carrier Concentration Measurements</i> o <i>4-point probe Measurements</i> o <i>Potentiostat / Galvanostat Measurements</i> o <i>X-Ray Fluorescence Spectroscopy</i> o <i>Grazing Angle X-Ray Diffraction</i> o <i>Proton Induced X-ray Emission</i> o <i>Rutherford Backscattering Spectroscopy</i> |
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QUALIFICATIONS

Doctor of Philosophy in Electrical Engineering; Stellenbosch University, 2021

Thesis: Thesis title: Planar magnetron sputtering of Ti and TiO₂ for polyethylene terephthalate track-etched membrane surface modification. The dissertation covers the research, development, and fabrication of hybrid polymeric membranes, lab-to-fab, for use in advanced technologies such as separation, biotechnology, and microelectronics. A combination of fundamental and applied research was required to consolidate advancements in developing and synthesizing hybrid membranes based on metal-polymeric and ceramic-metal-polymeric track-etched membranes. The combination of porous, organic films and inorganic layers to develop hybrid membranes was achieved by surface modification of porous polyester membranes using large-scale, roll-to-roll magnetron sputtering of Ti and TiO₂.

Master of Science in Electronic Engineering; Stellenbosch University, 2013

Thesis: Thesis title: Modified track-etched membranes using photocatalytic semiconductors for advanced oxidation water treatment processes.

Bachelor of Engineering in Mechatronics; Stellenbosch University, 2010

Final year Project (Baccalaureus Thesis): Water disinfection by aid of nanoparticles.

COURSES

Radiation Protection Officer; South African Health Products Regulatory Authority (SAHPRA), 2023

PROFESSIONAL EXPERIENCE

(CURRENT)

Joint Institute for Nuclear Research

December 2017 to Date

Scientific Researcher

September 2022 to Date

Core Overview:

- Department: Flerov Laboratory of Nuclear Reactions.
- Head of the National Group of the Republic of South Africa.
- Oversees research and development related to the joint SA-JINR Nanocenter projects.
- R&D in Composite and Hybrid Functional Nanomaterials Based on Track Membranes.
- Undertakes surface modification and physical vapor deposition intended for applications in various areas of industry and academia.
- Responsible for research and innovation grant management.
- Serves as liaison between JINR, South African based iThemba LABS and NRF.
- Supervises 3–4 South African students annually during their research stay at JINR, and oversees the annual international summer school and exchange program for 30–40 students, serving in both managerial and lecturing roles.

Senior Engineer

December 2017 to August 2022

Core Overview:

- Department: Flerov Laboratory of Nuclear Reactions.

- Head of the National Group of the Republic of South Africa.
- Completed advanced materials research and development for the development of new thin-film ceramics and hybrid materials.
- Completed energy materials research and development for the development of thin-film materials for triboelectrics, photocatalysis, photovoltaics, and solid-state electrolytes.
- Performed interfacial and surface analysis to test and investigate functional surfaces and tailor interface properties between metals, ceramics, and polymers.

PRIOR TENURES

Comberry Ltd.

July 2014 to November 2017

Process Engineer

- Optimised deposition parameters for thin-film layers in photovoltaic, photocatalytic, and smart glass unit films, utilising the IMI P30 system, as well as characterisation of the deposited thin films.
- Ensured full functionality of machines used in the production of thin-film smart glass, solid-state electrochromic devices, and photocatalytic cells.
- Collaborated with a team of engineers, providing technical consultation based on analysis and monitoring of performance processes, including cycle time, throughput, and material flow.
- Created, characterised, and maintained device prototypes within the production facility.
- Trained junior personnel on cleanroom health, safety, and quality standards.

Stellenbosch University

January 2013 to June 2014

Electrical & Electronic Engineering Department

Postgraduate Laboratory Manager

- Supervised and provided guidance to students on the proper utilisation, maintenance, and repair of equipment, in support of undergraduate and postgraduate project completion.
- Responsible for equipment maintenance.
- Performed sputter deposition, thermal evaporation, nanotechnology, and pulsed laser deposition.

EMOTIONAL INTELLIGENCE QUOTIENT & PROFESSIONAL STRENGTHS

(Essential Interpersonal Attributes / People Skills)

- **Strong attention to detail** and quantitative problem-solving skills.
- **Excellent capability to distil significant levels of information** from multiple sources into clear, relevant analyses and conclusions.
- **Proven proficiencies in directing a variety of competing priorities** requiring flexible and imaginative approaches, while offering unique guidance, inspiring innovation, and positively influencing others.
- **Reliable and takes ownership** of designated areas / tasks.

- **An effective communicator and collaborator** who conveys ideas and information in a clear and concise manner.
- **Adaptable to changing** and dynamic environments.
- **Committed to continuous learning** and development.
- **Deep understanding** of health and safety regulations within the research and development sphere.

JOURNAL ARTICLES

- Vinogradov, I. I., Drozhzhin, N. A., Kravets, L. I., **Rossouw, A.**, ..., (2024) Formation of Hybrid Membranes for Water Desalination by Membrane Distillation, *Colloid Journal*, Volume 86, doi:<https://doi.org/10.1134/S1061933X24600519>
- Evgeny Andreev, Hovakim Zakaryan, Tigran Harutyunyan, Ludmila Molokanova, Uliana Pinaeva, **Arnoux Rossouw**, ..., (2024) Enhancing virus inhibition in track-etched membranes through surface modification with silver nanoparticles and curcumin, *Surfaces and Interfaces*, Volume 53, doi:<https://doi.org/10.1016/j.surfin.2024.105064>.
- **Rossouw, A.**, Vinogradov, I. I., Serpionov, G. V., Gorberg, B. L., Molokanova, L. G., & Nechaev, A. N. (2023). Composite track membrane produced by roll technology of magnetron sputtering of titanium nanolayer. *Membranes and Membrane Technologies*, 4, 177–188. doi:10.1134/S2517751622030039
- **Rossouw, A.**, Olejniczak, A., Olejniczak, K., Gorberg, B., Vinogradov, I., Kristavchuk, O., . . . Dmitriev, S. (2022). Ti and tio2 magnetron sputtering in roll-to-roll fabrication of hybrid membranes. *Surfaces and Interfaces*, 31, 101975. doi:<https://doi.org/10.1016/j.surfin.2022.101975>
- **Rossouw, A.**, Temnov, D., Vinogradov, I., Shabanova, N., Mamonova, T., Lizunov, N., . . . Nechaev, A. (2022). Thermo-activation spectroscopy of track-etched membranes based on polyethylene terephthalate films irradiated by swift xe ions. *Radiation Physics and Chemistry*, 191, 109868. doi:<https://doi.org/10.1016/j.adphyschem.2021.109868>
- Gorokhovatskiy, Y., Temnov, D., Shabanova, N., & **Rossouw, A.** (2021). Thermoactivated current spectroscopy of polyethylene terephthalate films irradiated by heavy xenon ions. *Petersburg Polytechnical State University Journal*, 14, 187. doi:<https://doi.org/10.18721/JPM.14301>
- Perea, O., Uche, C., Bublikov, P., Bode-Aluko, C., **Rossouw, A.**, Vinogradov, I., . . . Petrik, L. (2021). Chitosan/peo nanofibers electrospun on metallized track-etched membranes: Fabrication and characterization. *Materials Today Chemistry*, 20, 100416. doi:<https://doi.org/10.1016/j.mtchem.2020.100416>
- Vinogradov, I., Nechaev, A., & **Rossouw, A.** (2021). Composite membranes based on a track membrane and chitosan nanoframeworks. *Science of Russia: Goals and Objectives*, 106–109. doi:<https://doi.org/10.18411/sr-10-06-2021-26>
- **Rossouw, A.**, Kristavchuk, O., Olejniczak, A., Bode-Aluko, C., Gorberg, B., Nechaev, A., . . . Apel, P. (2021). Modification of polyethylene terephthalate track etched membranes by planar magnetron sputtered ti/tio2 thin films. *Thin Solid Films*, 725, 138641. doi:<https://doi.org/10.1016/j.tsf.2021.138641>

- Ademola Bode-Aluko, C., Omoniyi, P., Htet, K., Laila, A.-N., Mohammed, A.-A., **Rossouw, A.**, . . . Sergey, (2020). Photocatalytic and antifouling properties of electrospun tio₂ polyacrylonitrile composite nanofibers under visible light. *Materials Science and Engineering: B*, 264, 114913. doi:<https://doi.org/10.1016/j.mseb.2020.114913>
- Bode-Aluko, C. A., Laatikainen, K., Perea, O., Nechaev, A., Kochnev, I., **Rossouw, A.**, . . . Petrik, L. (2019). Fabrication and characterization of novel nanofiltration polymeric membrane. *Materials Today Communications*, 20, 100580. doi:<https://doi.org/10.1016/j.mtcomm.2019.100580>
- Botha, R., Labuschagne, C., Williams, A., Bosman, G., Brunke, E.-G., **Rossouw, A.**, & Lindsay, R. (2018). Characterizing fifteen years of continuous atmospheric radon activity observations at cape point (South Africa). *Atmospheric Environment*, 176, 30–39. doi:<https://doi.org/10.1016/j.atmosenv.2017.12.010>
- Botha, R., Labuschagne, C., Williams, A., Bosman, G., Brunke, E.-G., **Rossouw, A.**, & Lindsay, R. (2018). Radon-222 measurements at Cape Point: A characterization of a 15 year time series. *Clean Air Journal*, 28, 19–20. Retrieved from http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S2410-972X2018000200010&nrm=iso
- Artoshina, O. V., Milovich, F. O., **Rossouw, A.**, Gorberg, B. L., Iskhakova, L. D., Ermakov, R. P., . . . Apel, P. Y. (2016). Structure and phase composition of thin TiO₂ films grown on the surface of metallized track-etched polyethylene terephthalate membranes by reactive magnetron sputtering. *Inorganic Materials*, 52(9), 945–954. doi:10.1134/S0020168516080021
- Artoshina, O. V., **Rossouw, A.**, Semina, V. K., Nechaev, A. N., & Apel, P. Y. (2015). Structural and physicochemical properties of titanium dioxide thin films obtained by reactive magnetron sputtering, on the surface of track-etched membranes. *Petroleum Chemistry*, 55(10), 759–768. doi:10.1134/S0965544115100011
- **Rossouw, A.**, Artoshina, O. V., Nechaev, A. N., Apel, P. Y., Petrik, L., Perold, W. J., & Pineda-Vargas, C. A. (2015). Stable Ion Beam Analysis (RBS and PIXE) Study of Photocatalytic Track-Etched Membranes, 591–596. doi:10.1142/9789814632041_0065

CONFERENCE PRESENTATIONS

- 1st SA-JINR Radiochemistry Consortium Workshop, NRF, South Africa, 2025
- SAINTS Physics Summer School, iThemba LABS, South Africa, 2025
- 2nd International African Symposium for Exotic Nuclei, South Africa, 2024
- SA-JINR International Summer School, iThemba LABS, South Africa, 2024
- NRF|SA|JINR – University Collaboration Workshop: CPUT, UWC, NWU, Venda, UniZulu 2024.
- SA-JINR International Summer School, iThemba LABS, South Africa, 2023
- NRF|SA|JINR – University Collaboration Workshop: TUT, WITS, UP, NMU, UJ, 2022.
- IX Annual Scientific Conference for Young Scientists and Specialists, Crimea: Alushta 2020.
- 5th South African Nanoscience and Nanotechnology Summer School, Stellenbosch: NanoAfrica Conference, 2019.
- 5th South African – JINR Symposium “Advances and Challenges in Physics within JINR and South Africa”, Cape Town: SA-JINR Symposium, 2018.
- Connecting Emerging Technologies with Global Brands, Santa Clara: IDTechEx, 2017.

- Energy-efficient Thin-film (pseudo) Supercapacitor Based on Solid-state Materials, Moscow: Skolkovo Startup Village, 2017.
- IDTechEx Launchpad Winner, Energy Storage Innovation, Berlin: IDTechEx, 2016.
- 4th South African – JINR Symposium “Few to Many Body Systems: Models and Methods and Applications”, Dubna: SA-JINR Symposium, 2015.

PATENTS

- Meshcheryakov, V., **Rossouw, A.**, Manakhov, A., Pogorelov, N., Kolesnikova, E., & Chugunov, V. (2020). Solid-state thin film hybrid electrochemical cell. United States Patent - US10734674B2. Retrieved from <https://patents.google.com/patent/US10734674B2/en>