

Isaac Nongwe Beas

Senior Research
Scientist & Academic
Professional

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Personal Statement

Experienced research scientist and academic professional with over 10 years of proven expertise in physical chemistry, heterogeneous catalysis, materials science, Gasification & Pyrolysis of biomass. Demonstrated track record in teaching at university level, supervising postgraduate students, conducting high-impact research, and engaging in community partnerships. Committed to advancing chemical education and research excellence in African institutions.

Education

- 2011–2013 **Ph.D. in Materials Science and Heterogeneous Catalysis**, University of Johannesburg, South Africa
Thesis: N-doped and B-doped carbon materials and Yolk carbon nanostructures: synthesis, characterisation, and application for heterogeneous catalysis. *Supervisors:* Prof. Neil Coville (WITS Univ.), Prof. R. Meijboom (UJ). *Specialization:* Physical Chemistry, Heterogeneous Catalysis, Carbon Nanomaterials
- 2008–2010 **M.Sc. in Physical Chemistry and Computational Chemistry**, University of Yaoundé I, Cameroon
Thesis: Thermodynamic study of the solubility of commercial gas oil in organic solvents. *Supervisor:* Prof. Paul Mingo Ghogomu. *Focus Areas:* Modeling, Thermodynamics, Kinetics, Computational Chemistry
- 2004–2008 **M.Sc. (Honours) Applied Chemistry**, University of Yaoundé I, Cameroon
Specializations: Physical Chemistry, Analytical Chemistry, Photochemistry
- 1994–2004 **B.Sc. in Physical Science**, University of Yaoundé I, Cameroon

Professional Experience

Research and Academic Positions

- July 2017–Present **Research Scientist**, Botswana Institute for Technology Research and Innovation (BITRI), Gaborone, Botswana
Leading research in materials science and heterogeneous catalysis. Managing multidisciplinary research projects in gasification and pyrolysis. Collaborating with industry partners for technology transfer applications.
- September 2017–Present **Research Fellow**, University of South Africa, South Africa
Supervising masters and doctoral students in physical chemistry. Contributing to scientific community through publications in accredited journals. Facilitating industry-academia partnerships for research commercialization.

May 2013–June 2017	Post-Doctoral Fellow, University of South Africa, South Africa Successfully supervised graduation of masters and PhD students. Conducted specialized course on nanoparticle technology fundamentals. Led industrial collaboration project with Council for Mineral Technology (Mintek).
January 2010–February 2012	Visiting Researcher, University of the Witwatersrand, Johannesburg, South Africa Conducted advanced experiments on carbon nanomaterials synthesis for catalysis.

Teaching Experience

University-Level Instruction

- 2012–2014 **Lecturer, University of Johannesburg, South Africa**
- CETAPB1: Analytical Chemical 2 Practical
 - CETP2B1: Physical Chemistry 2
 - CETQAB3: Chemical Quality Assurance
- 2001–2003 **Lecturer, University of Yaoundé I, Cameroon**
- CHIM 113: Atomistics and Chemical Bonding
 - CHIM 114: Basics of Thermodynamics
 - CHIM 120: Practicals in Chemistry

Research Output and Publications

Research Metrics

Publications	26 peer-reviewed journal articles
h-index	14
Citations	1,229
Research Gate Score	822.3

Recent Publications (2020–2025)

- 2025 **ZSM-5 Zeolite Synthesis from Coal Fly Ash Synthesised Silica**, *ChemistryOpen*, Wiley-VCH
T. Manyepedza, E.V. Gaolefufa, **I.N. Beas**, M. Maubane-Nkadieng, M.T. Kabomo. *ChemistryOpen* **2025**, 14, e202400314
- 2025 **Towards attainment of value-added chemicals with industrial applications over versatile LaCo_{1-x}Mn_xO_{3±δ} perovskites**, *Sustainable Materials and Technologies*, Elsevier
H.P. Mokwena, **I.N. Beas**, H. Li, N.N. Nyangiwe, N. Bingwa. *Sustainable Materials and Technologies* **2025**, 45, e01517
- 2025 **Comparative analysis of zeolites synthesized from acid refluxed and acid roasted coal fly ash**, *MRS Advances*, Springer
E.M.V. Gaolefufa, T. Manyepedza, **I.N. Beas**, B.F. Modukanele, M.T. Kabomo. *MRS Advances* **2025**, <https://doi.org/10.1557/s43580-025-01322-8>
- 2024 **Synthesis, Molecular Docking, and antibacterial evaluation of Quinoline-Derived Ni(II), Cu(II) and Zn(II) complexes**, *Results in Chemistry*, Elsevier
D. Dinku, T.B. Demissie, **I.N. Beas**, T. Desalegn. *Results in Chemistry* **2024**, <https://doi.org/10.1016/j.rechem.2024.101562>

- 2024 **Mechano-synthesis of a AgSrFeO₃ catalyst for epoxidation of ethylene in a chemical looping set-up**, *Journal of Materials Chemistry A*, Royal Society of Chemistry
C. Damba, **I.N. Beas**, M.M. Mapolelo, J. Darkwa, E.J. Marek. *J. Mater. Chem. A* **2024**, <https://doi.org/10.1039/D4MA00485J>
- 2024 **Characterisation of Bambara groundnut (*Vigna subterranea (L.) Verdc.*) shell waste as a potential biomass for different bio-based products**, *Environmental Monitoring and Assessment*, Springer
L.K. Ncube, A.U. Ude, E.N. Ogunmuyiwa, et al. *Environ Monit Assess* **2024**, <https://doi.org/10.1007/s10661-024-12937-z>
- 2024 **Cytotoxic Cu(II) Complexes with a Novel Quinoline Derivative Ligand**, *ACS Omega*, American Chemical Society
G. Shumi, T.B. Demissie, M. Koobotse, G. Kenasa, **I.N. Beas**, M. Zachariah, T. Desalegn. *ACS Omega* **2024**, <https://doi.org/10.1021/acsomega.4c02129>
- 2023 **The Transfer Hydrogenation of Cinnamaldehyde Using Homogeneous Cobalt (II) and Nickel(II) Complexes**, *Molecules*, MDPI
F.P. Sejie, O.A. Oyetunji, J. Darkwa, **I.N. Beas**, B.C.E. Makhubela, N.Y. Dzade, N.H. de Leeuw. *Molecules* **2023**, 28(2), 659
- 2023 **Thermogravimetric-mass spectrometry study of pyrolysis of Botswana-Morupule coal**, *Reaction Kinetics, Mechanisms and Catalysis*, Springer
K.P. Kgatlane, S. Odisitse, C. Gate, J. Darkwa, **I.N. Beas**. *React. Kinet. Mech. Catal.* **2023**, <https://doi.org/10.1007/s11144-023-02459-z>
- 2022 **Photocatalytic degradation of methylene Blue and ortho-toluidine Blue: Activity of Lanthanum composites La_xMO_y (M:Fe,Co,Ni)**, *Catalysts*, MDPI
M. Mocwana, P. Mokoena, P. Mbule, **I.N. Beas**, G. Kabongo, S. Ogugua, T. Tshabalala. *Catalysts* **2022**, 12(11), 1313
- 2021 **TiO₂@hollow carbon sphere: A photocatalyst for hydrogen generation under visible irradiation**, *Journal of Photochemistry and Photobiology A: Chemistry*, Elsevier
A. Boudjema, **I. Nongwe**, B.K. Mutuma, B.J. Matsoso, K. Bachari, N.J. Coville. *J. Photochem. Photobiol. A* **2021**, 417, 113355
- 2021 **Unravelling the interfacial interaction in mesoporous SiO₂@nickel phyllosilicate/TiO₂ core-shell nanostructures**, *Beilstein Journal of Nanotechnology*, Beilstein Institut
B.K. Mutuma, X. Mathebula, **I. Nongwe**, B.P. Mtolo, B.J. Matsoso, R. Erasmus, Z. Tetana, N.J. Coville. *Beilstein J. Nanotechnol.* **2021**, 11, 1834-1846
- 2020 **Cyclometalation of Lanthanum (III) based MOF for Catalytic Hydrogenation of Carbon Dioxide to Formate**, *RSC Advances*, Royal Society of Chemistry
P. Tshuma, B.C.E. Makhubela, L. Öhrström, S.A. Bourne, N. Chatterjee, **I.N. Beas**, J. Darkwa, G. Mehlana. *RSC Adv.* **2020**, 10, 3593-3605
- 2020 **Environmental Impact of Food Packaging Materials: A Review of Contemporary Development from Conventional Plastics to Polylactic Acid-Based Materials**, *Materials*, MDPI
L.K. Ncube, A.U. Ude, E.N. Ogunmuyiwa, R. Zulkifli, **I. Nongwe**. *Materials* **2020**, 13(21), 4994

Student Supervision

Successfully Completed Supervisions

- 2019–2021 **Tefo Olefile**, *University of Botswana*, M.Sc.
Catalytic dehydrogenation of ammonia borane using zeolite-metal based catalysts
- 2019–2021 **Thabiso Sekai**, *University of Botswana*, M.Sc.
Synthesis of aluminosilicates from coal fly ash for wastewater purification
- 2021–2023 **Kgalalelo Kgatlane**, *Botswana International University of Science and Technology*, M.Sc.
Thermogravimetric and evolved gas analyses of black lignite Botswana coal pyrolysis and combustion
- 2023–2024 **HP Mokwena**, *University of Johannesburg*, M.Sc. (Co-Supervisor)
Application of La-based inorganic multi cationic perovskites in the transformation of bioderived carbonyl-containing compounds to value-added chemicals

Current Doctoral Supervisions

- 3rd Year **Emmanuel Gaolefufa**, *University of Botswana*, Ph.D.
Synthesis of Zeolite from Botswana fly ash and application in heterogeneous catalysis
- 3rd Year **Thapelo Manyepedza**, *University of Botswana*, Ph.D.
Synthesis of silica nanoparticles from coal fly ash as a precursor for ZSM-5 synthesis
- 3rd Year **Ncube Lindani Koketso**, *Botswana International University of Science and Technology*, Ph.D. (Co-Supervisor)
Development of biodegradable hybrid polymer composite
- 2nd Year **Nampe Majoe**, *University of South Africa*, Ph.D. (Co-Supervision)
Catalytic role of MgO in black liquor when co-gasified with sawdust towards syngas production
- 2nd Year **B.E. Ncube**, *University of South Africa*, Ph.D. (Co-supervisor)
Thin-film composite membranes containing zwitterions

Academic Service and Leadership

External Examining and Moderation

- July 2021–Present **Moderator for Advanced Inorganic Chemistry**, *Sol Plaatje University*, South Africa
Honours module NCHM84316
- August 2022–Present **External Examiner for Honours research project**, *Sol Plaatje University*, South Africa
- May 2023–Present **Moderator final year Chemical Engineering**, *BIUST*, Botswana
Module CMM 521, MMEE 520 and 523
- January 2024–Present **External examiner for research proposal Ph.D**, *Banasthali Vidyapith*, India

Editorial and Review Activities

- Present **Young Advisory Board Member**, *Applied Catalysis A: General*, Elsevier

Present **Peer Reviewer**, *Multiple international journals*
Including: South African Journal of Chemical Engineering (Elsevier), Environmental Science and Pollution Research (Springer Nature), Reaction Kinetics, Mechanisms and Catalysis (Springer Nature), International Journal of Coal Science Technology (Springer Nature), Nature Portfolio clean water(Springer Nature), Next Materials(Elsevier), Results in Chemistry (Elsevier)

Community Engagement and Partnerships

Industry Collaboration

- 2013–2017 **Mintek Partnership**, *SO₂ reduction research project*
- Present **Technology Transfer**, *Multiple projects translating research into real-world applications*
- 2023 **Municipal Waste Projects**, *Converting waste to fuels and chemicals*
- Professional Development Activities**
- March 2023 **Invited Speaker**, *Engineers Registration Board Annual Forum*, Gaborone
Gave a two hours lecture on Waste Municipalities to Fuels and Chemicals
- May 2023 **Guest Lecturer**, *Kirinyaga University*, Kenya
Gave a lecture on Direct synthesis of dimethyl ether and methanol from carbon dioxide
- May 2005 **Training Facilitator**, *CODATA-RDA School of Research Data Science*, University of Pretoria, South Africa

Professional Memberships

- 2022–2024 **Member**, *African Materials Research Society*, AMRS2017
- Since 2012 **Member**, *Catalysis Society of South Africa*, Number 110
- Since 2011 **Corporate Member**, *South African Chemical Institute*, Number 17431
- Since 2010 **Member**, *Royal Society of Chemistry, United Kingdom*, Number 622502

Technical Skills and Competencies

Laboratory and Research Skills

- Advanced catalyst synthesis and characterization
Thermogravimetric and kinetic analysis
Materials science techniques and instrumentation
Computational chemistry and modeling

Educational Technology

- Learning Management Systems (Moodle, WiseUp)
Virtual teaching platforms (Microsoft Teams, Zoom)
Digital assessment and moderation tools

Leadership and Management

- Project management and coordination
Research team leadership
Risk assessment and safety management

Strategic planning and implementation

Languages

French Native proficiency

English Native proficiency

German Basic

Introductory course, 2016

Awards and Recognition

2024–Present **Young Advisory Board**, *Applied Catalysis A: General*, Elsevier

2017–Present **Research Fellow**, *University of South Africa*

References

Prof. Neil Coville, *University of the Witwatersrand, Johannesburg*,
Neil.Coville@wits.ac.za

Prof. R. Meijboom, *University of Johannesburg*, rmeijboom@uj.ac.za

Prof. James Darkwa, *University of Johannesburg*, jdarkwa@gmail.com