

CURRICULUM VITAE

NAME: **Dr. Raphael L. Nyenge**

CURRENT ADDRESS: KENYATTA UNIVERSITY,
DEPARTMENT OF PHYSICS,
P.O. BOX 43844-00100 KENYA.

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Area of Specialization

Materials Science: Luminescence materials, Electronics & Instrumentation

Research Interests

i) Phosphor materials

□ LED and Solar Cells applications; with emphasis on thin film technologies ii)

Electronics & Instrumentation

Google scholar link: <https://scholar.google.com/citations?hl=en&user=jDSpfJIAAAAJ> ORCID
ID: <https://orcid.org/0000-0003-2772-1783>

ACADEMIC AND PROFESSIONAL QUALIFICATIONS

- 2015 UNIVERSITY OF THE FREE STATE, SA ○
[Doctor of philosophy \(PhD\)](#) - Materials Science
Field of Study: Deposition of thin films using the PLD technique
Thesis Title: *Luminescence Investigations of CaS:Eu²⁺ Powder and Pulsed Laser Deposited Thin Films for Application in Light Emitting Diodes*
- 2007 KENYATTA UNIVERSITY
○ [Master of Science \(MSc\)](#)-Electronics
Field of Study: Electronics
Thesis Title: *The Design and Study of a Computer-Controlled Security System (CCSS) Based on a GSM Phone*
- 1990 KENYATTA UNIVERSITY
○ [BED \(SC\)](#)- PHYSICS (MAJOR), MATHS
- 1986 Kenya Advanced Certificate of Education (A-LEVEL), ST.PATRICK'S ITEN

1984: Kenya Certificate of Education (O-LEVEL), MACHAKOS TECHNICAL SCHOOL

EMPLOYMENT HISTORY

TEACHING AT KENYATTA UNIVERSITY Part-timer

- 2004-2011

Tutorial Fellow

- 2011-2015

Lecturer

- 2016-

ADMINISTRATIVE DUTIES AT KENYATTA UNIVERSITY

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| ☐ Member, SPAS conference committee | 16 th Mar, 2022 |
| ☐ Acting Chairman, Department of Physics, Kenyatta University | 2020, 2021, 2022 |
| ☐ Member, Departmental Programme Development Committee | 19 th Oct, 2020 |
| ☐ Member, Departmental Research and Innovation committee | 11 th Sept, 2020 |
| ☐ Department of Physics Seminar Coordinator | 2016- Jul 2023 |
| • Chairman of the Department of Physics | Jul 2023- |

TEACHING & ADMINISTRATION AT HIGH SCHOOL

May 1990-01/08/2011

- Physics Teacher
- ☐ Administrator (Senior HOD, Deputy Principal, Principal)

AWARDS

VICE CHANCELLOR'S AWARD 2024: for the innovation of Potato Tuber Germination Machine. Exhibited at the Nairobi International Trade Fair, 2024

ACHIEVEMENTS

(a) RSIF Cooperability Grant-2021, for a proposal titled "*An Integrated Near Infra-Red and Magnetic Field System for Non-Invasive Monitoring of body Glucose and Na⁺/K⁺ Concentration anomalies: for Diabetes/Cancer Diagnosis*"

(b) Partnership for skills in Applied Sciences, Engineering and Technology-Regional Scholarship Innovation Fund (PASET-RSIF).

- ✓ A member of the Materials Science group, led by Dr. W. K. Njoroge.

(c) African Laser Centre 2018 Research Collaboration Program

- ✓ Principal Investigator: Martin Ntwaeaborwa, Professor of Physics University of the Witwatersrand and Dr. Raphael Nyenge, Kenyatta University as the collaborating investigator

(d) 2017 VC's Research Grant Award

With Dr. Lawrence Ochoo as the Principal Investigator:
Research titled "*Electromagnetic Field Pulses-based Technology for Cancer Diagnosis and Treatment Monitoring*".

(e) National Research Fund (NRF, South Africa), research chair award to study for PhD (2013, 2014, 2015)

NETWORKS/COLLABORATIONS

- Memorandum of Understanding (MOU) for Academic Collaboration between University of Johannesburg and Kenyatta University
- Memorandum of Understanding (MOU) for Academic Collaboration between University of South Africa and Kenyatta University (**IN THE PROCESS**)
- Collaboration with Prof **Ntwaeaborwa**, University of the Witwatersrand on CSIR National Laser Centre/DST ALC Research Grant Application

CONSULTING FOR ORGANISATIONS/INSTITUTIONS

2021-	Contracted Professional, Kenya National Examinations Council
2004- 2012	KNEC SENIOR EXAMINER
1992- 2003	Kenya National Examinations Council (KNEC) PHYSICS PRACTICAL EXAMINER (EX NO: 0114)

COMMUNITY OUTREACH

2019-	BOM member, Kalulini Secondary School
2019-	BOM Chairman, Nthongoni Secondary School
2023-	Mentoring Kiwanja Sec School

SUPERVISION OF POSTGRADUATE STUDENTS

Ongoing Supervision

MSc-Thesis-Waswa Wekesa	2024
MSc Thesis-Annette Imali	2024
MSc Thesis-Lydia Kathure	2023
MSc. Thesis-Kirui Julius	2022
MSc Thesis, Mwangangi Peter	2021
MSc Thesis, Langat Kipkirui	2019
MSc Thesis, Kinyanjui Peter	2019
PhD Thesis, Maklewa A	2022
PhD Thesis, Ileri Nancy	2022
PhD Thesis, Makunda MMaloba	2017

Supervision of Postgraduate Students (Graduated)

MSc Thesis, Kinyumu Marcelina	2024
MSc Thesis, Bonface Musyoka	2023
MSc Thesis, Kasau Andrew	2023
MSc Thesis, Nyaga Janeleah	2023
MSc Thesis, Kavita D Mwanja	2022
MSc Thesis, Nyaga S Gitonga	2020
MSc Thesis, Okoth C Odhiambo	2021

THESES EXAMINATION

(a) Internal

Name	Reg. No.	Title	Date
Erick Rayora Nyakundi	I56/CE/24486/2012	Geophysical Investigation of Geothermal Potential of the Gilgil Area Nakuru County, Kenya Using Gravity	Sept.2016
Irungu M Kahura	I56/CE/26623/2011	Design and Fabrication of a Microcontroller-based Smart Door Lock	Dec. 2017
Keng'werere Joshua Mose	I56/CE/10899/2008	Design and Fabrication of a DualResistive Evaporation System Controlled Using LABVIEW	Jun, 2017
Maato Ombamba Jared	I56/CE/14122/2009	Design and Fabrication of a Computerbased Fingerprint Security System for Restricted access control	Dec. 2017
Mose Rose Gesare	I56/CE/11459/2008	Design and Fabrication of a Substrate Holder Controlled Using LABVIEW: Validated by Deposition of Cu _x N _y	Jun, 2017
Ndwiga Nicholas Kariuki	I56/CE/28336/2013	Design and Construction of a Microcontroller-based Five Degree of Freedom Robotic Arm Using Servo Motors	Dec. 2017
Seurey Paul	I56/CE/25984/2011	Geophysical Prospection for Geothermal Potential in Lake Baringo Area Using Magnetic Method	Dec. 2017
Edward O Ntabo	I56/CE/22398/2010	Characterization of p-SnS/n-CdS:Zn Thin Film Solar Cell	Feb 2018
Majau Agriphina Mugure	I56/CE/24240/2013	Design and Fabrication of an Autonomous line follower Robot Capable of Picking and Dropping Objects from One Point to Another	Feb 2018
Kamau Samuel	I56/26190/2011	Effects of <i>Aspergillus niger</i> on Mechanical, diffusion and thermal degradation properties of recycled low density polyethylene	Aug 2018
Nancy Wanja Ileri	I56/CE/12771/2009	Characterization of Tin Telluride (Sn _x Te _y) Thin Film For Phase Change Memory (PCM) Applications	Aug 2018
Otieno Philip Jeremia	I56/CE/22396/2010	Investigating the Optical and Electrical Properties of Cu ₂ O and ZnS:Al Thin Films for Solar Cell Applications	Nov 2018
Kabaraka James Otieno	I56/CE/22402/2010	Influence of i-ZnO Buffer Layer on Cu ₂ O-ZnO:Al PN Junction For Solar Cell Applications	Dec 2018

Magare Aondo Douglas	I56/CE/27970/2014	Design and Analysis of Microstrip Antenna for 2.4 GHz Applications	Feb.2019
M/TH/039/2019	NA	Characterization of SnS-SnO ₂ : Sb P-N for Solar Cell Applications	June, 2019
M/TH/160/2019	NA	Design and Construction of a Microcontroller-Based Human Audio Noise Monitoring and Control System	Dec 2019
M/TH/180/2019	NA	Optical and Electrical Characterization of Cd _x Ni _{1-x} S and Sb ₂ S ₃ Thin Films for Photovoltaic Application	Dec 2019
M/TH/029/2020	NA	TiO ₂ -Cu Thin Film Material for Optical Gas Sensor Applications	Feb 2020
M/TH/186/2021	NA	Optical Characterization of Compounds for Dye Sensitized Solar Applications	Dec 2021
PhD/047/2021	NA	Crystallization Kinetics, Structure and Optical Properties of In-Se-Bi Bulk and thin films for Reversible Phase Change Memory (PRAM) Applications	Sept 2021
MTH-213-2022	NA	<i>Fabrication and Characterization of Zinc Oxide Based Dye Sensitized Solar Cell</i>	Dec 2022
PhD/020/2022	NA	Human Exposure to Natural Radiation in Bureti Sub County of Kericho County, Kenya	April 2022
PhD/092/2022	NA	Synthesis, Fabrication and Characterization of Solid TiO ₂ Based Solar Cell Doped with Different Organic and Inorganic Luminescent Materials	Sept 2022
PhD/105/2022	NA	<i>Development of a Photothermal Induced Optical Scattering Modulation (Ptiosm) Technique and Its Application in Malaria Diagnosis</i>	Nov 2022
MTH-024-2024	NA	<i>Experimental-Numerical Study On Roof-Top Solar Pv Performance Under Different Roofing Materials And Air Gaps In Tropical Climates</i>	Feb 2024

(b) External

Name	University	Degree	Title	Date
Kwamboka Jane Omboto	Jomo Kenyatta University of Agri. & Techn.	MSc	Analysis of the Wind Energy Characteristics and Potential on the Hilly Terrain of Manga, Nyamira County, Kenya	Sept.2018
Kyalo Ngesu Kiteme	Univestity of South Africa (UNISA)	MSc	Rare Earth Doped Sodium Alumium Silicate for Optical Cooling Application	March 2021
Mr M C Manaka	Univestity of South Africa (UNISA)	PhD in Physics	The development of undoped alkaline silicate and doped alkaline aluminate phosphors for white phosphorescence, dosimetry, and Persistent luminescence applications	August 2022
Mr F V Molefe	University of South Africa	PhD	Surface Functionalization Of Graphene Oxide For Application In Organic Solar Cells	Jan 2023
M G Tsegay	University of South Africa	PhD	Green synthesis of Cr2O3 nanocoatings as spectrally selective solar absorbers for lowtemperature applications	Jan 2024
Mr M W Juma	University of South Africa	PhD	Localized surface plasmon resonance and Vibrational Spectroscopic study of trenbolone acetate dopant towards its rapid and label-free detection	Nov 2024

PEER REVIEWER (a) Research Publications

Publisher	Title	Date
Physica B: Condensed Matter	Photoluminescence and temperature-dependent luminescence of $\text{Ca}_5(\text{PO}_4)_3\text{OH}$ doped Eu^{3+} phosphors	May 2023
Luminescence: The Journal of Biological and Chemical Luminescence	Sol-gel synthesis and photoluminescent properties of metal oxide-metal oxide coupled nanocomposites	Dec 2022
Journal of the Optical Society of America B	Luminescence in Africa: A brief overview	Apr 2022
Journal of the Optical Society of America B	Luminescence in Africa: A brief overview	Apr 2020

International of Green Technology	Performance Assessment and Economic Viability of Standalone Photovoltaic Systems for Rural Households in Kathiani, Machakos County, Kenya	Jan 2020
International of Green Technology	Post-Occupancy energy efficiency and indoor environment performance in selected commercial buildings in Nairobi, Kenya	Dec 2019
Journal of Luminescence	Photoluminescence studies of green emitting $\text{BaB}_8\text{O}_{13}$: Bi^{3+} phosphors prepared by solution combustion method	Feb 2018
Indian Journal of physics	Anomalous Magnetoelectricity and Electrical transport of polyaniline coated Ternary Carbide $\text{Ti}_{0.9}\text{Al}_{0.1}\text{C}$	Jan 2017

(b) National Research Fund-Kenya ✓

Review of Proposals

(c) Book Editing

Publisher	Title	Author	Date
Kenyatta University Press	Principles of Electromagnetics	Merenga Abdallah Sarroney	April 2019

PUBLICATIONS AND CONFERENCES

(a) Publications

Post-PhD

1. R. L. Nyenge, H. C. Swart, O. M. Ntwaeaborwa, *Auger electron spectroscopy study and depth profile analyses of the CaS:Eu^{2+} pulsed laser deposited thin luminescent films* Appl. Phys. A (2016) 122:621 DOI 10.1007/s00339-016-0135-3.
2. Simon N. Ogugua, Raphael L. Nyenge, Phillip T. Sehogela, Hendrik C. Swart, Odireleng M. Ntwaeaborwa, *Influence of deposition atmosphere and substrate temperature on the structure, morphology, and photoluminescence of pulsed laser deposited $\text{La}_{0.5}\text{Gd}_{1.5}\text{SiO}_5\text{:Dy}^{3+}$* , 34 021520 (2016); doi: 10.1116/1.4942502.
3. L.L. Noto, D. Poelman, V.R. Orante-Barrón, H.C. Swart, L.E. Mathevula, R. Nyenge, M. Chithambof, B.M. Mothudia, M.S. Dhlaminia, *Photoluminescence and thermoluminescence properties of BaGa_2O_4* , Physica B 535 (2018) 268–271.
4. Musila N., Munji M., Simiyu J., Masika E. and Nyenge R., (2018). Optical Properties and Analysis of OJL Model's Electronic inter-band Transition Parameters of TiO_2 Films, *Trajectoria Nauki = Path of Science*, **4(7)**:3001-3012
<https://pathofscience.org/index.php/ps/article/view/528>
5. Musila N., Munji M., Simiyu J., Masika E. and Nyenge R., (2018). Effect of TiO_2 Compact Layer on DSSC Performance, *Trajectoria Nauki = Path of Science*, **4(9)**:5001-5008 <https://pathofscience.org/index.php/ps/article/view/547>

6. Musila N., Munji M., Simiyu J., Masika E., Nyenge R. and Kineene M., (2018). Characteristics of TiO₂ Compact Layer prepared for DSSC application, *Traektoriâ Nauki =Path of Science*, **4(10)**:3006-3012
<https://pathofscience.org/index.php/ps/article/view/557>
7. Kasau, M., Nyenge, L., & Munji, K. (2022). Analysis of energy potential for grid-tied solar energy systems for medium industrial applications. *African Journal of Pure and Applied Sciences*, 3(2), 237-246. <https://doi.org/10.33886/ajpas.v3i2.295>
8. Mutinda, M., Munji, K., & Nyenge, L. (2023). Implementation of a Wide Band and Low Noise Signal Generator Based on Phase Locked Loop. *African Journal of Pure and Applied Sciences*, 4(1), 50-59. <https://doi.org/10.33886/ajpas.v4i1.371>
9. Maklewa Agoundedemba, Mazabalo Baneto, Raphael Nyenge, Nicholas Musila , Kicoun Jean-Yves N'Zi Toure (2023). Improving FTO/ZnO/In₂S₃/CuInS₂/Mo solar cell efficiency by optimizing thickness and carrier concentrations of ZnO, In₂S₃ and CuInS₂ thin films using Silvaco-Atlas Software. *International Journal of Renewable Energy Development*, **12 (6)**, 1131-1140
10. Maklewa Agoundedemba, Chang Ki Kim, Hyun-Goo Kim, Raphael Nyenge Nicholas Musila (2025). Modelling and optimization of microgrid with combined genetic algorithm and model predictive control of PV/Wind/FC/battery energy systems. *Energy Reports* **13** (2025) 238–255

PhD Work

1. R.L. Nyenge, H.C. Swart, O.M. Ntwaeaborwa, *Influence of Substrate Temperature and Deposition pressure on Pulsed laser deposited thin films of CaS:Eu²⁺ phosphors*, *Physica B* **480** (2016)186-190.
2. R.L. Nyenge, H.C. Swart, D. Poelman, P. F. Smet , L.I.D.J. Martin, L.L. Noto, S. Som, O.M. Ntwaeaborwa, *Thermal quenching, cathodoluminescence and thermoluminescence study of Eu²⁺ doped CaS powder*, *J. Alloys Compd.* **657** (2016) 787-793.
3. R.L. Nyenge, H.C. Swart, O.M. Ntwaeaborwa, *Luminescent properties, intensity degradation and X-ray photoelectron spectroscopy analysis of CaS:Eu²⁺ powder*, *Opt. Mater.* **40** (2015) 68–75.
4. R.L. Nyenge, P.T. Sechogela, H.C. Swart, O.M. Ntwaeaborwa, *The influence of laser wavelength on the structure, morphology and photoluminescence properties of pulsed laser deposited CaS:Eu²⁺ thin films*, *J. Mod. Opt.* **62** (2015) 1102-1109, DOI: 10.1080/09500340.2015.1020898.
5. R. L. Nyenge, S.K.K. Shaat, L.L. Noto, P.P. Mokoena, H. C. Swart, O. M. Ntwaeaborwa, *TOF SIMS Analysis, Structure and Photoluminescence Properties of Pulsed Laser Deposited CaS:Eu²⁺ thin films*, *J. Lumin.* **167** (2015) 172-178.

(b) Presentations in Conferences/Workshops PhD Work

1. R. L. Nyenge, in attendance, the 58th annual conference of South African Institute of Physics (SAIP), 8-12th July, 2013, Richards Bay Campus, University of Zululand.
2. R. L. Nyenge, P.T. Sechogela, H. C. Swart, O. M. Ntwaeaborwa, “The influence of laser wavelength on the structure, morphology and photoluminescence properties of pulsed laser

- deposited CaS:Eu²⁺ thin films”, ALC femto second Laser Workshop, 18-20 NOV 2014, University of Stellenbosch, South Africa.
3. R. L. Nyenge, S.K.K. Shaat, L. L. Noto, P. P. Mokoena, H.C. Swart, O.M. Ntwaeaborwa, “TOF SIMS Analysis, structure and photoluminescence properties of pulsed laser deposited CaS:Eu²⁺ thin films”, 6th South African Conference on Photonic Materials, 5 - 7 May 2015, Mabula Game Lodge, Limpopo, South Africa.
 4. R.L. Nyenge, H. C. Swart, O. M. Ntwaeaborwa, “The influence of the number of pulses and post annealing on the morphology and photoluminescence properties of CaS:Eu²⁺ pulsed laser deposition thin films”, 60th Annual Conference of the South African Institute of Physics, 29 June – 3 July 2015, Port Elizabeth, South Africa.
 5. R.L. Nyenge, H.C. Swart, O.M. Ntwaeaborwa, “Cathodoluminescent and Photoluminescent Properties of Pulsed Laser Deposited Thin Film Phosphors”, International Conference on Laser Ablation 31 August - 4 September 2015, Cairns, Queensland, Australia.

Post PhD Conferences

1. Ochoo Lawrence, Nyenge Raphael, Electro-magnetic Field Technology as Profiler for Cancer Diagnosis and Treatment Monitoring, Masinde Muliro University of Science and Technology, 13th Multidisciplinary International conference, 19th -21st June, 2019.
2. Ochoo Lawrence, Nyenge Raphael, Electro-magnetic Field Technology as Profiler for Cancer Diagnosis and Treatment Monitoring, Kenyatta University Biennial Research and Innovation conference, 23rd -25th October, 2019.

REFEREES

1. PROF O.M. NTWAEABORWA
UNIVERSITY OF THE FREE STATE, DEPARTMENT OF PHYSICS,
P.O. BOX 339, BLOEMFONTEIN, REPUBLIC OF SOUTH AFRICA, ZA-9300
2. PROF H.C. SWART
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P.O. BOX 339, BLOEMFONTEIN, REPUBLIC OF SOUTH AFRICA, ZA-9300
3. DR. MIGWI
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4. Dr. P. K Kariuki
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