Curriculum Vitae

Dr. Francis Otieno (PhD)

Current affiliation: Department of Physics and Materials science, School of Biological and Physical Science Maseno University, Kenya.

1. PERSONAL INFORMATION

Place of Birth: Kisumu, Kenya.

Nationality : Kenyan

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2. ENERGY CONCERN:

Highly concerned with need to redouble global efforts in order to realize the United Nations Sustainable Development Goal 7 by 2030 with less than 8 years to go. This is even more urgent in Africa in order to ensure that the world does not fall short of ensuring universal access to affordable, reliable, sustainable, and modern energy. This is my driving force to research into energy.

3. RESEARCH INTERESTS:

My research interest is based on renewable energy; technology transfer, research and development and commercialisation with an aim of realizing SDG 7. My academic background entailed fabrication and characterization of solar devices including organic solar cells, dye sensitized solar cell and perovskites with a view to enhance performance using plasmonics, spectral conversion and varied device structure. Thin film growth and characterization via physical deposition technique such as sputtering, thermal evaporation, pulse laser deposition etc. My latest project explores growth and characterization of mixed conducting perovskites (ABO_3) thin films such as $LaSrCrFeO_4$ and $LaSrCrMnO_4$) for potential use as cathode materials in Solid Oxide Fuel Cells (SOFCs). Among characterization techniques include GiXRD, Raman, PL including TRPL, SEM, tapping mode AFM, RBS, *I-V* characterization, EIS and synchrotron characterization techniques such as Grazing incidence Wide & Small angle XRD among others. Currently employed as full time lecturer at Maseno University, Kenya having returned upon completion of my Msc, PhD and postdoctoral fellowship at University of the Witwatersrand funded by Synchrotron techniques for Africa Research and Technology-Global Challenge Research Fund (START-GCRF).

4. ACADEMIC BACKGROUND

2016 to 2018	PhD in Physics at University of the Witwatersrand. **Research title**: Investigation of ZnO, AZnO and Rare earth doped ZnO thin films for spectral conversion and application to solar cells.
2014 to 2015	MSc in Physics at University of the Witwatersrand. **Research title:** Enhancement of photo-conversion efficiency of organic solar cells by plasmon resonance effect.
2004 to 2008	Bachelor of Education (Science) - Physics and Mathematics at Egerton University-Kenya.
1999 to 2002	Kenya Certificate of Secondary Education at Eastleigh High School, Nairobi.
1999 to 2002	Kenya Certificate of Primary Education at Ojola Kadero Primary School, Kisumu.

5. WORK EXPERIENCE

2021 to date	Lecturer in the department of Physics and Materials science, Maseno University, Kenya. **Role:** Teaching and supervision of undergraduate and postgraduate students from Physics and other faculties such as Education (science).
2018 to 2021	Post-doctoral fellowship in the School of Chemistry, University of Witwatersrand. **Research topic:** use of synchrotron techniques to characterize Solid Oxide Fuel Cells thin films and ternary active layer of organic solar cell devices.
2019 to 2020	Appointed sessional lecturer, School of Physics University of the Witwatersrand, South Africa. **Role:** Teaching PHYS1034 (Applied Physics) and Coordinating Physics 1st year tutorials.
2008 to 2014	Teacher of Mathematics and Physics at Ngiya Girls High School and Sunshine School, Nairobi. **Role:** Teaching Physics and Mathematics for Form 1-4.

6. POSTGRADUATE SUPERVISION (ONGOING)

	Student Name:	Program and year:	Title:
(i)	Mr. Anindo Adonija	Msc -Physics (Yr 2 of 2)	Optimization of thickness and morphology of active layer for high performance of bulk-heterojunction organic solar cells.
(ii)	Mr. Frankline Wekesa	Msc -Physics (Yr 1 of 2)	Comparison of organic polymer P3HT blended with fullerene acceptor $PC_{71}BM$ vs non-fullerene acceptor COi8DFIC: Experimental, DFT and TD-DFT Study.
(iii)	Miss Elizabeth Odunga	Msc -Physics (Yr 1 of 2)	Probing of structural and optical properties of organic solar cell devices made of PBDB-T-2CL:COi8DFIC active layer coupled with Density functional theory (DFT) simulation
(iv)	Simiyu Karungani Emmanuel	Msc -Physics (Yr 1 of 2)	Study of inorganic lead halide perovskites properties using first-principles density functional theory for photovoltaic and optoelectronic devices
(v)	John Okoth Odhiambo	Msc -Physics (Yr 1 of 2)	Structural and Optical Probe into Rare Earth Doped In2Se3 for Spectral Conversion in Solar Cells
(vi)	Ochodo Ekabat Titus	Msc -Physics (Yr 1 of 2)	Fabrication and characterization of ternary organic solar cells.
(vii)	Cynthia Adhiambo Gwada	Msc -Chemistry (Yr 1 of 2)	Surface-enhanced Raman spectroscopy for bioanalysis and diagnosis using Ag Nanoparticles.
(viii)	Esther Nyaboke Magara	Msc -Physics (Yr 1 of 2)	Efficiency enhancement of organic solar cell using surface plasmon resonance effects of Ag nanoparticles
(ix)	Charity Jebon Simotwo	Msc -Physics (Yr 1 of 2)	Structural and Optical Probe into Rare Earth Doped ZnO for Spectral Conversion in Solar Cells

7. SUMMER SCHOOLS ATTENDED

i) International School for Materials for Energy and Sustainability IV (ISMES IV) held in Colorado school of Mines – Colorado, USA. Held (13 – 20 July 2015). The aim of the School was to present the state-of-the-art and the future perspectives for materials as they can be applied to energy generation and storage for sustainable energy technologies.

ii) 5th School Materials for Energy and Sustainability-" and 3rd "EPS-SIF International School on Energy held at Ettore Majorana Foundation and Centre for Scientific Culture in Erice, Italy. Held (13-19 July 2016). The aim of the School was to present the state-of-the-art and the future perspectives for materials applied to the generation and storage for sustainable energy technologies.

8. COMMUNITY SERVICE

14th February 2023	Organized International Union of Pure and Applied Chemistry International Organized the Union of Pure and Applied Chemistry (IUPAC) Global Women's Breakfast at Maseno University. 120 delegates attended including High School Students
6 September 2018	Hosted an awareness and outreach activity for the 69th Lindau Nobel Laureate Meeting 2019 on Physics at the University of the Witwatersrand. Funded by Academy of Science of South Africa (ASSAf).
10-14 May 2017	Wits University Yebo Gogga 2017 exhibition to primary, secondary students and parents in Johannesburg – South Africa.
12-16 Sep 2016	Deutsche Schule Scienceweek2016 held at deutsche Internationale Schule Johannesburg, South Africa where learners from Grade 1 to 11, as well as, learners from partner schools in Mamelodi and Eersterust experienced science and technology first hand
9 May 2015	Wits university focus day themed Your launchpad to success for Grade 11 and 12's from across the country for its annual Focus Day, aiming to expose students and their parents to the University's culture, functioning and academic programmes.

9. LIST OF PUBLICATIONS

i) **Francis Otieno**, Mildred Airo, Daniel Wamwangi, Alexander Quandt and Rudolph Erasmus. "Annealing effect on the structural and optical behavior of ZnO:Eu^{3+} thin film grown using RF magnetron sputtering technique and application to dye sensitized solar cells." *European Physical Journal Plus (**IF 3.758**)* 10.1140/epjp/s13360-023-04714-7 (2023).

ii) Shnier, A., Otieno, F., Billing, C., Wamwangi, D., & Billing, D. G. (2023). Robust Arduino controlled spin coater using a novel and simple gravity chuck design. HardwareX, 14, e00422.

iii) Otieno Francis, Mildred Airo, Rudolph M. Erasmus, Caren Billing, Alex Quandt, Daniel Wamwangi, and David G. Billing. "Structural and Optical Probe into Rare Earth Doped ZnO for Spectral Conversion in Solar Cells." In Luminescent Nanomaterials, pp. 383-427. *ISBN 978-981-4968-11-9 (Hardcover), 978-1-000-00000-0 (eBook) Jenny Stanford Publishing*, 2022.

iv) Ngubeni, Grace N., Olusola Akinbami, Lineo Mxakaza, Siyabonga Nkabinde, Tshwarela Kolokoto, **Francis Otieno**, Makwena J. Moloto, Kalenga P. Mubiayi, and Nosipho Moloto. "Evaluating the effect of the substrate on the electrocatalytic performance of $Cu_2ZnSnS4$ and Cu2ZnSnSe4 counter electrodes in dye-sensitized solar cells." *Thin Solid Films - Elsevier (**IF 2.030**)* (2022): 139099.

v) Mayimele, N., **F. Otieno**, S. R. Naidoo, D. Wamwangi, and. "Efficiency enhancement of organic solar cell using surface plasmon resonance effects of Ag nanoparticles." *Optical and Quantum Electronics* (**IF 2.084)** 53, no. 11 (2021): 1-14.

vi) **Otieno, Francis**, Lesias Kotane, Mildred Airo, Rudolph M. Erasmus, Caren Billing, Daniel Wamwangi, and David G. Billing. "Comparative investigation of fullerene PC71BM and non-fullerene ITIC-Th acceptors blended with P3HT or PBDB-T donor polymers for PV applications." *Frontiers in Energy Research* (**IF 2.96**) 9 (2021): 162.

vii) **Otieno, Francis**, Lesias Kotane, Mildred Airo, Caren Billing, Rudolph M. Erasmus, Daniel Wamwangi, and David G. Billing. "Probing the properties of polymer/non-fullerene/fullerene bulk heterojunction ternary blend solar cells, study of varied blend ratios of PBDB-T: ITIC-Th: PC 71 BM." *The European Physical Journal Plus* (**IF 3.228**) 136, no. 2 (2021): 1-17.

viii) Olusola Akinbami, Grace Ngubeni, **Francis Otieno** *et al*., The effect of temperature and time on the properties of 2D Cs_2ZnBr_4 perovskite nanocrystals and its application in a Schottky barrier device." *Journal of Materials Chemistry C (**IF 7.059**)* 9, no. 18 (2021): 6022-*6033*.

ix) **Francis Otieno**, Mildred Airo, Rudolph Erasmus, Alexander Quandt, David G. Billing and Daniel Wamwangi. "Annealing effect on the structural and optical behavior of ZnO:Eu^{3+} thin film grown using RF magnetron sputtering technique and application to dye sensitized solar cells." *Scientific Reports-Nature (**IF 4.576**)* 10.1 (2020): 1-10.

x) Mildred Airo, **Francis Otieno**, Lineo Mxakaza, Adewale Ipadeola, Rudo S. Kadzutu-Sithole, Lerato F. E. Machogo-Phao, Caren Billing, Makwena Moloto, Nosipho Moloto. "Probing the stoichiometry dependent catalytic activity of nickel selenide counter electrodes in the redox reaction of

iodide/triiodide electrolyte in dye sensitized solar cells." *RSC Advances- Royal Society of Chemistry (**IF 3.119**)* – 10(65), 39509-39520.

xi) **Francis Otieno**, Mildred Airo, Rudolph Erasmus, Theodore Ganetsos, Alexander Quandt and Daniel Wamwangi. "Role of oxygen concentrations on structural and optical properties of RF magnetron sputtered ZnO thin films." *Optical and Quantum Electronics-Springer (**IF 1.842**)* 51.11 (2019): 359.

xii) **Francis Otieno**, Mildred Airo, Eric G. Njoroge, Rudolph Erasmus, Theodore Ganetsos, Alexander Quandt and Daniel Wamwangi. "Effect of implantation of Sm^{+} ions into RF sputtered ZnO thin film." *AIP Advances – AIP (**IF 1.627**)* 9.4 (2019): 045210.

xiii) **Francis Otieno**, Mildred Airo, Rudolph M. Erasmus, David G. Billing, Alexander Quandt, and Daniel Wamwangi. "Effect of thermal treatment on ZnO: Tb^{3+} nano-crystalline thin films and application for spectral conversion in inverted organic solar cells." *RSC Advances- Royal Society of Chemistry (**IF 3.119**)* 8, no. 51 (2018): 29274-29282.

xiv) **Francis Otieno**, Shumbula N Prince, Mildred Airo, Mlambo Mbuso, Nosipho Moloto, Rudolph Erasmus, Alex Quandt and Daniel Wamwangi. "Improved efficiency of organic solar cells using Au NPs incorporated into PEDOT:PSS buffer layer." *AIP Advances AIP (**IF 1.627**).* 7.8 (2017): 085302.

xv) **Francis Otieno**, Mildred Airo, Rudolph M. Erasmus, David G. Billing, Alexander Quandt, and Daniel Wamwangi. "Structural and spectroscopic analysis of ex-situ annealed RF sputtered aluminium doped zinc oxide thin films." *Journal of Applied Physics-AIP (**IF 2.286**)* 122.7 (2017): 075303.

xvi) **Francis Otieno**, Bridget Mutuma, Mildred Airo, Kamalakannan Ranganathan, Neil Coville and Daniel Wamwangi, "Enhancement of organic photovoltaic device performance via P3HT:PCBM solution heat treatment." *Thin Solid Films - Elsevier (**IF 2.030**)* 625 (2017): 62-69.

xvii) **Otieno, Francis**, Mildred Airo, Kamalakannan Ranganathan, and Daniel Wamwangi. "Annealed silver-islands for enhanced optical absorption in organic solar cell." *Thin Solid Films - Elsevier (IF 2.030)* 598 (2016): 177-183.

xviii) Airo, Mildred, Siziwe Gqoba, **Francis Otieno**, Makwena Justice Moloto, and Nosipho Moloto. "Structural modification and band-gap crossover in indium selenide nanosheets." *RSC Advances-Royal Society of Chemistry (**IF 3.119**) 6.47 (2016): 40777-40784.*

xix) Airo MA, Rodrigues R, Gqoba S, Ntholeng N, **Otieno F**, Moloto MJ, Greenshields MW, Hümmelgen IA, Moloto N. Colloidal InSe nanostructures: Effect of morphology on their chemical sensitivity to methanol and formaldehyde fumes. *Sensors and Actuators B: Chemical Elsevier (**7.100**)*. 2016 Nov 29;236:116-25.

xx) **Francis Otieno**, K. Kamalakan, D. Wamwangi, 'Enhancing light absorption and life-time stability of organic solar cells using pentacene encapsulation. *Proceedings of SAIP2015* - ISBN: 978-0-620-70714-5.

xxi) **Francis Otieno**, Mildred Airo and Daniel Wamwangi. Raman spectroscopy analysis of RF sputtered ZnO thin film of varied thickness annealed at different temperature. *Thin Solid Films - Elsevier (**IF 2.030**)* **-** Under review