

Dr. Kiptiemoi Korir Kiprono
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Nationality: Kenya

Gender: Male

Date of Birth: 8th December 1981

Areas of Research

- Density functional theory development and application
- Piezoelectric effect in 1D systems and materials for energy storage
- Semiconductors and ultra hard materials
- Solid state sensors
- Catalysis
- Nanotechnology
- High performance computing

Work Experience

- August 2014 to Date: Lecturer, Department of Mathematics and Physics, Moi University, Box 3900, Eldoret Kenya.
- April 2014 to June 2014: Visiting researcher, University of Valencia, Spain.
- September 2011 to December 2013: Graduate student assistant, Polytechnic University of Turin, Italy.
- July 2007 to December 2010: Laboratory Demonstrator, Physics Department, Moi University.

Responsibility

- February 2017 to March 2019: Ag. Dean, School of Science, Alupe University College, Box 845, Busia Kenya.
- July 2016 to Feb 2017: GSREC representative for School of Biological and Physical Sciences, Moi University.
- January 2020 to Date: Chairman of Departmental Post-graduate Committee
- January 2021 to Date: Representative of Mathematics, Physics and Computing at the School Graduate Committee

Education and degrees awarded

- January 2011 to February 2014: Ph.D. in Electronic devices, Polytechnic University of Turin, Italy. Thesis title: ZnO nanowires for energy harvesting and gas sensing applications: a quantum mechanical study. Thesis Advisors: Prof. Giancarlo Cicero, Prof. Alessandra Catellani.
- August 2007 to December 2010: M.Sc. in Solid State Physics, Moi University. Thesis title: 4d transition metal carbides and nitrides: A first principle study. Thesis Advisors: Dr. N. W. Makau, Prof. G. O. Amolo, and Prof. D. P. Jourbert
- May 2002 to December 2006: Bachelor of Science (Physics and Mathematics), Moi University. Graduated with second class Honours.
- 1997 - 2000: High School Education, Uasin Gishu High School, Eldoret- Kenya. Obtained B+

of 83 points in Kenya Certificate of Secondary Education (KCSE).

- 1988 - 1996 : Primary Education, Eming Primary School. Obtained 490/700 points in Kenya Certificate of Primary Education (KCPE).

Other Educational Training, Short Courses, Qualifications, and Skills

- Intellectual property, April 2023
- Digital Education Masterclass, July 2022
- Pedal online: Technology for Transformative Pedagogy, September 2021
- Workplace health, safety & environment (HSE) management, September 2020
- Taking your teaching online, August 2020
- Social Safeguards, Tom Mboya Labour College, Kisumu, October 2019
- Certified energy Manager (CEM), July 2018
- Electronic structure methods, on following electronic structure codes: Vienna Ab initio Simulation Package. Quantum espresso, wanT, and LAMMPS, Held at University of Witwatersrand- S.Africa 2015.
- Programme Development and Curriculum Delivery, ACEII-PTRE Moi University, June 2018
- Leadership and Management, ACEII-PTRE Moi University, October 2017
- Joint Innovation and Incubation Training, ACEII-PTRE Moi University, February 2020
- High Performance Computing (CINECA Bologna-Italy 2011)

Linguistic skills

English, Kiswahili, Kalenjin, and Italian.

Conferences Attended and Presentations

- K. K. Korir "Low Dimensional Materials for Energy and Environmental Applications: Insights from Density Functional Studies", Moi University at 40 conference, June, 2024
- K. K. Korir "Kohn-Sham, Exchange-Correlation functionals, approximations" RASESMA 2023 TUK-Nairobi, Feb 2023
- 19th International Workshop on Computational Physics and Material Science: Total Energy and Force Methods at the ICTP from 09 January 2019 to 11 January 2019.
- K. K. Korir, "ZnO/TiO₂ Nanostructures For Energy Harvesting" March 2018, University of South Africa, Physics Department.
- K. K. Korir, A. Catellani, G. Cicero, "Thermal properties of ZnO nanowires" June 2013, King College, London-UK.
- K. K. Korir, G. Cicero, A. Catellani, "Polar properties of ZnO nanowires: a theoretical study", IWZNO, September 2012, Nice, France
- K. K. Korir, G. Cicero, A. Catellani, "Gas sensing application of ZnO nanowires", ICON-2013, September 2013, Annecy, France.
- K. K. Korir, G. Cicero, A. Catellani, "Thermoelectric properties of ZnO nanowires", Advanced School on Semiconductor Nanowires, Oct 2013, Sardinia, Italy
- K. K. Korir, A. Catellani, G. Cicero, "An ab-initio study of oxygen vacancies in ZnO nanowires", ICG, Nov 2013, Parma, Italy

Publications

I. Articles

- **K. K. Korir**, G. O. Amolo, N. W. Makau and D. P. Joubert, First-Principle calculation of bulk properties of 4d transition metal carbides and nitrides in the rocksalt, zincblende and wurtzite structures, *Diamond and Related Materials*. 20, 157-164 (2011).
- **K K Korir**, G Cicero, and A Catellani, Piezoelectric properties of zinc oxide nanowires: an ab-initio study, *Nanotechnology* 24, 475401 (2013).
- **K K Korir**, G Cicero, and A Catellani, Ethanol *gas sensing mechanism with ZnO nanowires: an ab initio study*, *J. Phys. Chem. C*, 118, 24533–24537 (2014).
- A Tamvakos, **K K Korir**, D Tamvakos D Callestani, and G Cicero, NO_x gas sensing mechanism with ZnO nanowires: Combined experimental and theoretical study, *ACS Sens.* 1 (4), 406–412 (2016).
- Odhiambo, H., Amolo, G., Makau, N., **Korir, K. K.**, & Othieno, H. Nitrogen Doping of Hexagonal and Cubic Ge₂Sb₂Te₅ Nanocrystals: An Ab Initio Study. *International Journal of Nanoscience*. 17(06), 1850009 (2017).
- W. Apondo, J. Cherutoi, **K. K. Korir**, K. Thiong'o, C. Okuku, and J. Mukola, Analysis of surface ozone and its contributors with relevance to urban air pollution, a case of Nairobi County Kenya, *Journal of Agricultural and Environmental Sciences*, 15: 28-42 (2018).
- **K K Korir**, G Cicero, A Catellani, Tailoring of oxygen vacancies concentration in ZnO nanowires: ab-initio study, *J. Appl. Phys.* 120, 125301 (2016).
- **K K Korir**, G Cicero, A Catellani, Tailoring of oxygen vacancies concentration in ZnO nanowires: ab-initio study, *J. Appl. Phys.* 120, 125301 (2016).
- Haffad Slimane, and **Kiptiemoi Korir Kiprono**. Interfacial structure and electronic properties of TiO₂/ZnO/TiO₂ for photocatalytic and photovoltaic applications: A theoretical study. *Surface Science*. 686, 10-16 (2019).
- Muchiri, P. W., V. M. Mwalukuku, **K. K. Korir**, G. O. Amolo, and N. W. Makau. Hardnesscharacterization parameters of Niobium Carbide and Niobium Nitride: A first principles study. *Materials Chemistry and Physics*. 229, 289-294 (2019).
- Philemon, K. T., & **Korir, K. K.** Carbon dioxide gas sensing, capture, and storage potential of calcium oxide surface and single walled carbon nanotube: insights from ab initio simulation. *Journal of Physics: Condensed Matter*, 32(24), 245901 (2020).
- **Korir, K. K.**, & Philemon, K. T. Tailoring Single Walled Carbon Nanotube for Improved CO₂ Gas Applications: Insights from Ab initio Simulations. *Materialia*, 100694 (2020).
- Re Fiorentin, M., Korir, K. K., & Risplendi, F. Substitutional impurities in monolayer hexagonal boron nitride as single-photon emitters. *Nanomaterials and Nanotechnology*, 10, 1847980420949349 (2020).
- **Korir, K. K.**, Benecha, E. M., Nyamwala, F. O., & Lombardi, E. B. . Tuning electronic structure of ZnO nanowires via 3d transition metal dopants for improved photo-electrochemical water splitting: An ab initio study. *Materials Today Communications*, 26, 101929 (2021).

- Muchiri, P. W., **Korir, K. K.**, Makau, N. W., & Amolo, G. O. The impact of anionic vacancies on the mechanical properties of NbC and NbN: An ab initio study. *Computational Materials Science*, 203, 111113 (2022).
- Philemon, K. T., **Korir, K. K.**, Musembi, R. J., & Nyongesa, F. W. (2023). Engineering 2D MoS2 for Enhanced Selectivity and Sensitivity of Selected Green House Gases (CO₂, CH₄ and N₂O): An ab initio Study. *Materialia*, 29, 101785 (2023).
- Kiptarus, J. J., **Korir, K. K.**, Githinji, D. N., & Kiriamiti, H. K. A Review of Design and Development of Selected Transitional Metal Doped Zinc Sulphide Nanostructure Surface Layers Decorated with Graphene for Hydrogen Production. *International Journal of Materials Engineering* 14(1): 12-24 (2024).
- Philemon, K. T., **Korir, K. K.**, Musembi, R. J., & Nyongesa, F. Optimizing 2D MoS2 for removal of anionic heavy metals from water: insights from density functional theory study. *Indian Journal of Physics*, 1-9 (2024).

II. Book Chapter & Theses

- **Kiprono Korir Kiptiemoi**, ZnO nanowires for energy harvesting and gas sensing applications: a quantum mechanical study. Tesi di dottorato (2014), DOI: [10.6092/polito/porto/2539901](https://doi.org/10.6092/polito/porto/2539901)
- Philemon, K. T., **Korir, K. K.**, Robinson, M. J., & Cherutoi, J. K. Structural and electronic properties of light atom doped 2D MoS2: Quantum mechanical study. In *Advances in Phytochemistry, Textile and Renewable Energy Research for Industrial Growth* (pp. 157-161). CRC Press (2022).

Supervision of Post Graduate Students

- Muchiri Perpetua Wanjiru: Effect of Defects and Temperature on the Mechanical Properties of NbC and NbN: A First Principle's Study. Technical University of Kenya (**Graduated with an MSc, 2023**)
- Letting Silas Kering: Interplay of Axis Ratio on Neutron Flux in a Spheroid Nuclear Reactor Core Using Jacobi Elliptic Theta Functions, Moi University (**Graduated with a PhD, 2022**)
- Philemon Kibet: Characterization CaO, Zeolite and Carbon Nanotube for CO₂ Capture: An Ab Initio Study. MSc, University of Nairobi (**Graduated with an MSc, 2018**)
- William Okoth: Analysis of Surface Ozone and its Contributors In Nairobi County With Relevance to Urban Air Pollution. MSc, Moi University (**Graduated with an MSc, 2018**)
- Joan Kiptarus: Development and Optimization of Zinc Sulphide Nanostructure Surface Layers with Transition Metal Dopants for Photocatalysis. Moi University (**on going, PhD Student**)
- Cosmas Kosgei: An Aprotic Quinone Based Redox Battery for Energy Storage, Moi University (**on going, PhD Student**)

- Philemon Kibet: Engineering of 2D MoS₂ for Improved Gas Sensing, Heavy Metals Capture and Hydrogen Harvesting: An ab initio study, University of Nairobi (**on going, PhD Student**)
- Edward Ntabo: Tuning ZnO Nanowires for Enhanced Photo-Electrochemical Water Splitting: Quantum Mechanical Study. University of South Africa (**on going, PhD Student**)
- Cosmas Chumo: A quantum mechanical study of Cu (111) - transition metal nano alloy composites for enhanced Electrochemical CO₂RR. University of South Africa (**on going, PhD Student**)
- Elias Sang Komen: Tailoring MoS₂ for Improved Photo-Catalysis. University of Eldoret (**On going, MSc student**)
- Martin Oundo Radol: Alloying Copper for Enhanced CO₂ Electro-Reduction and Product Selectivity. University of Eldoret (**on going, MSc student**)
- Gloria Mule Mumbi: Effects of Embelin Additive on the Optoelectronic Properties of Formamidinium Mixed Lead Halide Perovskite Solar Cell: An Ab Initio Density Functional Theory Study. Moi University (**on going, MSc student**)
- Meshack Kiptui: Effect of Open Metal Sites on Carbon Capture by Metal-Organic Framework (MOF-16): Insight from DFT. MSc student, Moi University (**on going, MSc student**)

Theses Examined

- Gilbert Murei (PhD, 2023): Tailoring Raman Scattering for Cancerous Cells Prediction Using Electromagnetic and Oscillating Electric Fields, Moi University
- Micah Omari (PhD, 2021): Experimental and computational modeling of molecular products from the thermal degradation of Tobacco, Marijuana and Khat, Moi University
- Joyce Mukhwana Ngala (MSc, 2019): Comparative Analysis of Spectral Theory of Differential and Difference Operators on Hilbert Spaces, Moi University
- B. Nyadoro (MSc, 2018): A Theoretical Study of Transition Metal Defect and Complexes of Nitrogen and Boron, University of South Africa
- Wesley Cheruiyot Koech (PhD, 2017): Modelling and Simulation of the Motor-Gear-Alternator Model to Amplify the Usability of the Solar Energy for Commercial and Domestic, Moi University
- Kiplagat Nicholas Kipkosgei (MSc, 2016): I- and G- Optimality Criteria For Second order Rotatable Designs in Three Domensions, Moi University
- Musundi Berlyl Onyuma (MSc, 2016): Modelling Cholera Transmission Incorporating Media Coverage, Moi University

- Chebii Kipkoech (MSc, 2015): Density Test, Fractional Distillation and Fluorescent Adsorption with Fourier Transform Infrared Spectroscopy for rapid Determination of Adulterant Kerosene in Gasoline and Diesel, Moi University
- Tecla Cheptoo (MSc, 2016): Extraction Isolation and characterization of Compounds from *Euphorbia prostrata* and Their Analgesic properties, Moi University

Professional Membership and Other Affiliations

- Jan 2018 to Date: Member of Material Research Society of Kenya (MRSK <https://mrsk.or.ke/current-members/>)
- Jan 2017 to date: African centre of excellence in Phyto-chemicals, textile, and renewable energy (ACEII-PTRE) co-ordinator for renewable energy component.
- 2014 to Date: Frequent reviewer of ACS applied materials and interfaces, Intermetallics (Elsevier), and Materials Chemistry and Physics (Elsevier)
- 2011–2014: Awarded Early-stage Marie Curie fellowship, IMEM-CNR-Italy.

Research Funds

- Jan 2016: Participated in the development of proposal for Centre of Excellence in Phyto-chemicals, textile, and Renewable energy (ACEII-PTRE). Co-ordinator for renewable energy component.
- I have also been involved in the development of other proposal that have been successful i.e., MIRET (Mobility for Innovative Renewable Energy Technologies), and ICPTRE.
- National Multiplication Training (NMT) on Enhancing Strategic Leadership and Management of Institutions of Higher Learning in Post Covid-19 Era, 2022
- ICTP - ASEMANET Mobility grant 2023
- ICTP Physics Without Frontiers 2023

Community Service and Outreach

- March 2015: Participated in Physics popularization drive targeting high schools students, held at Vihiga County- Mbale High School.
- Jan 2020: Conducted renewable energy training, with the focus on biogas, targeting High schools within the North-Rift region. The training was conducted in Moi Girls-Eldoret, Paul Boit High School, Kaptagat Girls, and Kapsabet Boys
- Cycling enthusiast and road marshal under Mama cycling – Uasin-Gishu chapter
- Chess trainer and Arbiter – Uasin- Gushu

Collaborations

- Prof. Evans Benecha, University of South Africa. Project: Modified ZnO Nanostructures for energy and gas sensing applications
- Prof. Francesca Risplendi, Prof. Giancarlo Cicero, and Prof. Michele Refiorentini, Politecnico Di Torino- Italy and Instituto Italiano Di Techonogia (IIT). Project: Alloying Copper with Zinc for CO₂ Reduction.

- Dr. Slimane Haffad, University A. Mira of Bejaia, Algeria. Project: Modelling MOFs for Hydrogen storage
- Prof. G. O. Amolo, Technical University of Kenya. Project: Hardness Characterization of Nitrides and Carbides of Niobium.

Referees

Prof. Nicholas W. Makau,
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