KENYATTA UNIVERSITY

PRESENTATION

COHORT III ORIENTATION

28th JUNE 2021

Presenter: DR. WALTER NJOROGE

Physics Department

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INTRODUCTION

Kenyatta University

Nairobi, Kenya **:** African Host University (AHU)

Thematic area: Minerals, Mining and Materials Engineering

Program: PhD (Material Science)

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KENYATTA UNIVERSITY

Prof. Paul Wainaina
Vice-Chancellor

Prof. Paul Okemo
Ag. Deputy Vice-Chancellor
(Academic)

Prof. Fredrick Gravenir
Deputy Vice-Chancellor
(Research, Innovation and Outreach)

Prof. Fatuma Chege
Deputy Vice-Chancellor
(Administration)

Prof. Godfrey Mse
Deputy Vice-Chancellor
(Finance and Planning)

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Brief History of Kenyatta University

TEMPLER BARRACKS
(BRITISH GOVERNMENT)

1965
KENYATTA COLLEGE

1975
KENYATTA UNIVERSITY COLLEGE
(CONSTITUENT COLLEGE OF UNIVERSITY OF NAIROBI)

1985
KENYATTA UNIVERSITY

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Schools at Kenyatta University

- ❑ Agriculture and Enterprise Development
- ❑ Applied Human Sciences
- ❑ Architecture and Built Environment
- ❑ Business
- ❑ Economics
- ❑ Education
- ❑ Engineering and Technology
- ❑ Environmental Studies
- ❑ Hospitality and Tourism
- ❑ Humanities and Social Sciences

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Schools at Kenyatta University

- ❑ Law
- ❑ Medicine
- ❑ Peace and Security Studies
- ❑ Public Health
- ❑ **Pure and Applied Sciences**
- ❑ Virtual and Open Learning
- ❑ Visual and Performing Arts

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VISION STATEMENT

"To be a dynamic, an inclusive and a competitive center of excellence in teaching, learning, research and service to humanity. ”

MISSION STATEMENT

"To provide quality education and training, promote scholarship, service, innovation and creativity and inculcate moral values for sustainable individual and societal development.”

.”

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IDENTITY STATEMENT

"A community of scholars committed to the generation and dissemination of knowledge and cultivation of wisdom for the welfare of society.”

PHILOSOPHY STATEMENT

“Sensitivity and responsiveness to societal needs and the right of every person to knowledge

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SOME KEY UNIVERSITY FACILITIES

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MAIN GATE

Students computer labs

Central Administration Complex

Graduate school

Campanile

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EDUCATION AND TRAINING IN MATERIAL SCIENCE

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School of Pure and Applied Sciences

Departments

- Biochemistry, Microbiology and Biotechnology
- **Chemistry**
- Mathematics, Statistics and Actuarial Sciences
- **Physics**
- Plant Sciences
- Zoological Sciences

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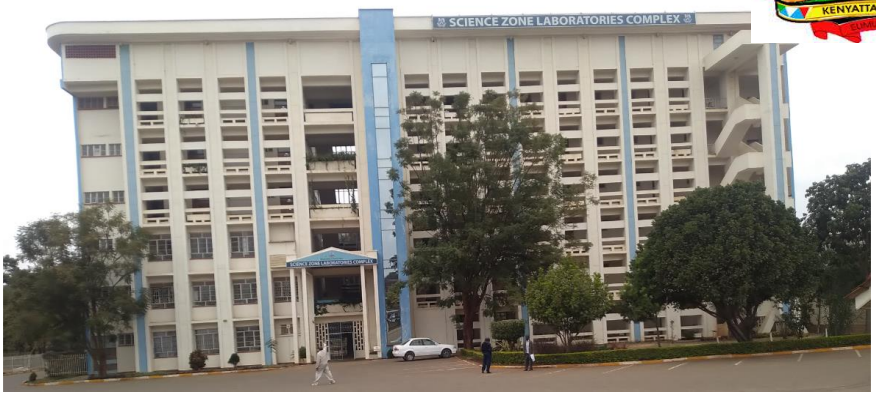
Laboratories



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Department of Physics

http://spas.ku.ac.ke/index.php/departments/department-of-physics

Active Areas of Specializations

- ✓ Astronomy and Astrophysics
- ✓ Applied Nuclear Physics
- ✓ Electronics and Instrumentation
- ✓ Environmental Physics
- ✓ Geophysics
- ✓ **Materials Science**
- ✓ Theoretical Atomic Collision Physics

Staff

19 Academic

18 Ph.D. holders

10 Technical

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Material Science Physics

❑ **Academic Staff**

- ✓ Dr. Walter K. Njoroge – Team Leader
- ✓ Dr. Abdallah S. Merenga
- ✓ Dr. Charles M. Migwi
- ✓ Dr. Daniel B. Bem
- ✓Dr. Nicholas M. Muendo
- ✓Dr.Phillip Musyimi

Prof. John Okumu -
Dr. Mathew K. Munji
Dr. Raphael L. Nyenge
Dr. Lawrence O. Ochoo
Dr. Stanley W. Kahuthu

❑ **Collaborators**

- ✓ Prof. Eevan Dyk –Nelson Mandela University' South Africa
- ✓Prof. Martin Ntwaeaborwa-University of the Witwatersrand, South Africa
- ✓Prof. Mokhotjwa Dhlamini- University of South Africa UNISA; South Africa
- ✓Dr. Daniel Wamwangi-University of the Witwatersrand, South Africa

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Material Science Research

Research areas:

A). Nano Technology /Thin film technology

Synthesis of nanoparticles/ deposition of thin films for various applications

Solar cells
Memory
LEDs

Water treatment
Gas sensing
Energy efficient windows

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Material Science Research Cont;

Preparation of thin films using various deposition techniques
Characterization of thin films for optoelectronic devices
Fabrication and Characterization of solar cells/ modules
Theoretical Modeling of various semi-conductor properties for various applications

Polymer physics research

- Research on biodegradable polymers
- Characterization of mechanical, optical and electrical properties

Research Facilities

Main facilities for research:

Thin Film Deposition techniques

- ✓Sputtering / evaporation
- ✓Spray pyrolysis
- ✓Spin coating
- ✓Chemical bath deposition
- ✓Electroplating
- ✓Chemical vapor deposition (CVD)

Characterization techniques

- ✓Optical spectroscopy
- ✓Electrical characterization
- ✓Dynamical mechanical analyzer

Computer modeling
- ✓ Computer cluster
- ✓ Quantum espresso
- ✓ Lab view
- ✓ MATLAB

Research Facilities cont;

Facilities available from collaborations

- ✓ X-ray Diffraction (XRD)
- ✓ Scanning Electron Microscopy (SEM) / EDS
- ✓ Atomic Force Microscopy (AFM)
- ✓ Transmission Electron Microscopy (TEM)
- ✓ Rutherford Backscattering Spectroscopy (RBS)
- ✓ Photo-luminescence spectro-photometer
- ✓ Hall Effect
- ✓ Raman Spectroscopy
- ✓ X-ray Photo Spectrometer (XPS)

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Thin film Coating Unit

- Sputtering technique both DC and RF for metals, oxides and oxy-nitrides films
- Evaporation including reactive evaporation

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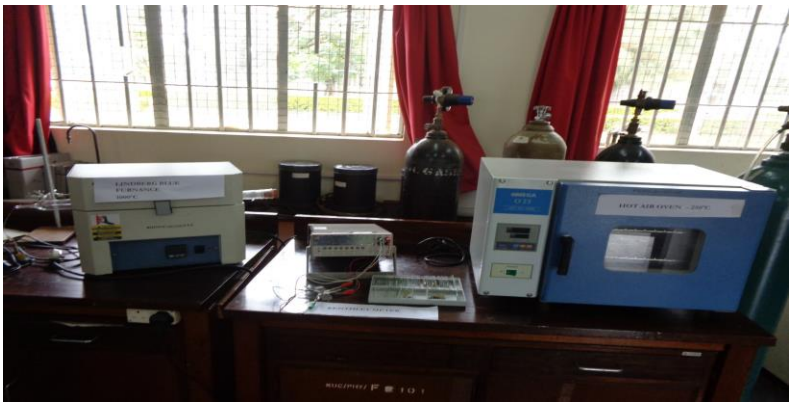
Post deposition treatment ;

Annealing facilities in air or inert ambient



Electrical characterization employing isothermal or non-isothermal annealing

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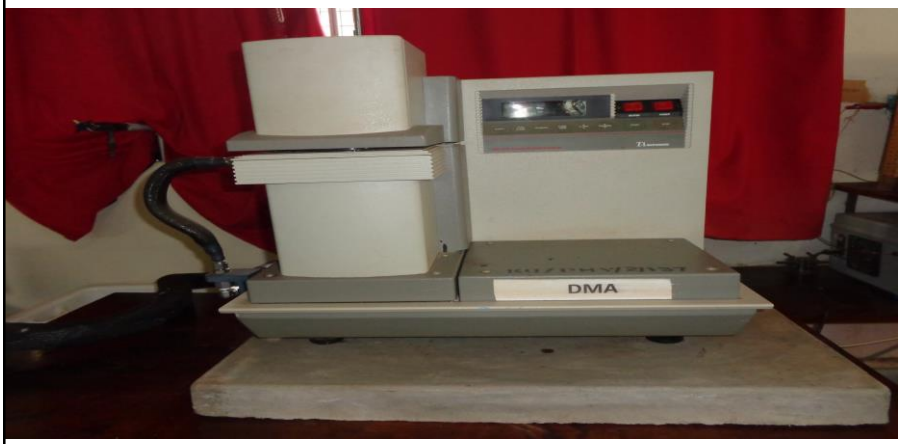
Dynamical Mechanical Analyser



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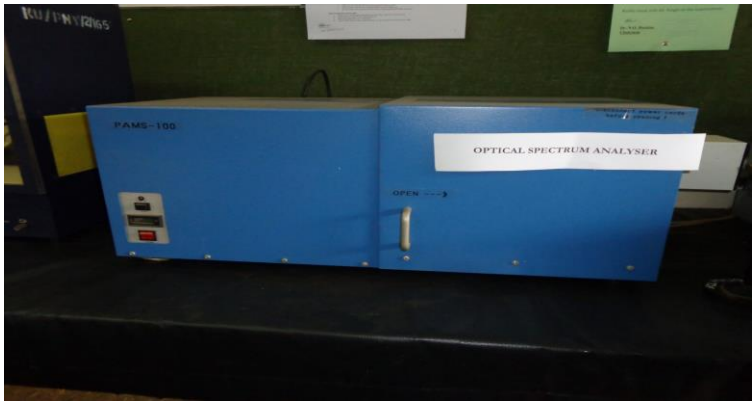
Spectrophotometer for transmittance and reflectivity measurement



Optical constants deduced from the measured data through simulations

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Current Research Topics

Ph.D. Students
Ongoing

Kimemia Njoroge "Synthesis, Fabrication and Characterization of Solid TiO2 –Based Solar cell doped with different organic and inorganic Luminescent Materials"

Wangati Charles Kiama "Synthesis and Characterization of $CuAl_xB_{1-x}Se_2$ Thin Films deposited by Magnetron Sputtering for Photovoltaic Applications "

Muchira Irene Wanjiku " Characterization Kinetics of InBiSe Thin Films for Phase Change Memory(PRAM) Applications"

Mwenda Phylis Makena "An experimental investigation of spray pyrolysis deposited Indium Gallium Nitride [In1-x Gax N] thin films for photovoltaics applications"

Mosiori Cliff Orori "Effect of Ag Nps on optical response of CH3NH3PbI3 thin films on photon sensing"

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Thank you

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