PWANI UNIVERSITY

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ACADEMIC QUALIFICATIONS

PHD CANDIDATE IN ORGANIC SEMICONDUCTOR PHYSICS AND DEVICES (ORGANIC PHOTOVOLTAICS), GERMANY
M.SC. (PHYSICS- MATERIAL PHYSICS & ELECTRONICS), KENYATTA UNIVERSITY-KENYA
BACHELORS DEGREE IN PHYSICS AND MATHEMATICS AT KENYATTA UNIVERSITY, KENYA
INTRODUCTION TO ENGINEERING AT AFRICAN VIRTUAL UNIVERSITY (AVU)
CERTIFICATE IN SMASSE IN KENYA
DIPLOMA IN COMPUTER ENGINEERING AND NETWORKING, BELL INSTITUTE OF TECHNOLOGY
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RESEARCH

CURRENT RESEARCH

IN THIS RESEARCH, WE EXPLORE ALL THE POSSIBILITIES OF IMPROVING THE PCE OF ORGANIC SOLAR CELLS FABRICATED FROM CONJUGATED POLYMERS. THIS WE DO BY SEEKING TO IMPROVE THE LIGHT ABSORPTION AND HARVESTING BY THE CELL, MAXIMIZING THE EXCITON GENERATION, IMPROVING THE CHARGE TRANSPORT, CHARGE SEPARATION AND FINALLY MAXIMIZING THE CHARGE COLLECTION AT THE ELECTRODES. WE APPLY PHYSICAL CONCEPTS OF MOLECULAR ORDERING IN THE CONJUGATED POLYMER OVER LARGE DISTANCES FROM THE NANO TO THE MACRO-SCALE. BOTTOM-UP APPROACHES ARE USED AND IN PARTICULAR, SELF-ASSEMBLY ADOPTED TO ACHIEVE THE LONG RANGE-ORDER. IN ADDITION, PATTERNING OF THE ACTIVE LAYERS IN THE OPV FILMS IS PERFORMED USING LITHOGRAPHY TECHNIQUES TO PROVIDE PRECISE CONTROL OF THE HETEROJUNCTION MORPHOLOGY. CONSEQUENTLY, BASED ON A PROFOUND UNDERSTANDING DERIVED FROM THE PROPOSED MODEL STUDIES, THEORETICAL INTERPRETATION AND MODELING OF OPTIMALLY PERFORMANT DEVICES TOGETHER WITH THEORETICAL INPUT ARE UNDERTAKEN.

RESEARCH CARRIED OUT

1. DEVICE INTERFACING AND AUTOMATION USING LABVIEW, KENYATTA UNIVERSITY POSTGRADUATE
2. E-LABS FOR E-LEARNING STUDENTS (PWANI UNIVERSITY)

3. "THE OPTIMIZATION OF THE ELECTRIC CONDUCTIVITIES OF D.C. SPUTTERED CUPROUS OXIDE THIN FILMS FOR SOLAR CELL FABRICATION (KENYATTA UNIVERSITY)
4. "DESIGN AND FABRICATION OF A SIMPLE FOUR POINT PROBE SYSTEM FOR ELECTRICAL CHARACTERIZATION OF THIN FILMS" (KENYATTA UNIVERSITY & UNIVERSITY OF NAIROBI)

RESEARCH INTERESTS

- CONJUGATED SYSTEMS
- ORGANIC SOLAR CELLS
- NANOELECTRONICS AND NANOSCALE DEVICES FABRICATION
- CNT/POLYMER COMPOSITE MATERIALS
- SEMICONDUCTOR DEVICE FABRICATIONS
- CARBON NANOTUBES AND GRAPHENE-BASED ELECTRONIC DEVICE FABRICATIONS

JOURNALS AND PAPERS PRESENTED

J.O. AGUMBA, P.K. KARIMI, G. KATANA, J.O. OKUMU "THE DEVELOPMENT OF LABVIEW BASED PHYSICS E-LABORATORY. INTERNATIONAL JOURNAL OF CURRENT RESEARCH. VOL. 3, ISSUE 6, PP. 123-129, JUNE,2011.

J.O. AGUMBA, P.K. KARIMI, J.O. OKUMU, W.K. NJOROGE "DESIGN AND FABRICATION OF A SIMPLE FOUR POINT PROBE SYSTEM FOR ELECTRICAL CHARACTERIZATION OF THIN FILMS" INTERNATIONAL JOURNAL OF CURRENT RESEARCH. VOL. 3, ISSUE 7, PP. 135-139, JULY, 2011.

OTHERS:

BOOK PUBLICATION

JOHN AGUMBA, JOHN OKUMU, PARTICK KARIMI LABVIEW RUN FOUR POINT PROBE, ELECTRICAL CHARACTERIZATION OF SEMICONDUCTING THIN FILMS MADE EASY BY FOUR POINT PROBE SYSTEM CONTROLLED BY LABVIEW, LAP LAMBERT ACADEMIC PUBLISHING GMBH & CO. SAABRÜCKEN, GERMANY 2012

TECHNICAL SKILLS

- OPTICAL MICROSCOPY, AFM, OPTICAL SPECTROSCOPY, THIN FILM DEPOSITION, STM, XRD
- SOUND KNOWLEDGE IN DIGITAL ELECTRONICS WITH DATA ACQUISITION AND PC INTERFACING
- EMBEDDED SYSTEM DESIGN WITH MICROPROCESSORS AND MICROCONTROLLERS. SKILLS IN DESIGN AND CONSTRUCTION OF ELECTRONIC INTERFACES FOR AUTOMATING EXPERIMENTS WITH REMOTE AND ITS APPLICATIONS WITH NATIONAL INSTRUMENT'S DATA ACQUISITION BOARDS AND OTHER EQUIPMENT
- ADEQUATE SKILLS IN HIGH LEVEL PROGRAMMING IN LABVIEW-FOR INTERFACING AND AUTOMATION, MODELING, COMPUTATIONS AND ANALYSIS
- GOOD SKILLS IN THIN FILM SCIENCE