



## Okumu Fredrick Oluoch

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Address	Jaramogi Oginga Odinga University of Science and Technology, School of Biological, Physical, Mathematics and Actuarial Sciences, Department of Physical Sciences, P. O. Box 210-40601, Bondo-Kenya.

### **Educational background**

Doctorate (2013 - 2016)	Doctor of Technology in Chemistry, Cape Peninsula University of Technology (CPUT), Cape Town, South Africa.
Masters (2011 - 2013)	Master of Technology in Chemistry, Cape Peninsula University of Technology (CPUT), Cape Town, South Africa.
Bachelors (2005 - 2009)	Bachelor of Science in Chemistry, (First class Honors'), University of Nairobi (UoN), Nairobi, Kenya.

### **Professional/Work Experience**

Dec 2016 – Currently Lecturer (Physical Chemistry), Department of Physical Sciences, Jaramogi Oginga Odinga University of Science and Technology (JOUST), Bondo, Kenya.

May 2016 – Sept 2016 Retention Officer, Department of Chemistry, CPUT, Cape Town, South Africa.

Feb 2015 – Dec 2015 Teaching Assistant, Department of Chemistry, CPUT, Cape Town, South Africa.

Jul 2013 – Dec 2014 Part-time Lecturer, Department of Chemistry, CPUT, Cape Town, South Africa.

May 2011 – May 2013 Tutorial Fellow, Department of Chemistry, CPUT, Cape Town, South Africa.

### **Prizes, Awards, Fellowships**

#### **a) Academic Awards**

- (i) DAAD Postdoctoral Fellowship award in Sub-Saharan Africa, 2022
- (ii) Commonwealth Chemistry Congress conference sponsorship award, 2021
- (iii) DAAD In-region PhD scholarship, 2013-2016
- (iv) Cape Peninsula University of Technology (CPUT), Master's scholarship, 2011-2012

#### **b) Research Grants**

- (i) Royal Society of Chemistry (RSC) Research Fund grant (R21-3087051063), USD 3,000, 2021/2022
- (ii) National Research Foundation South Africa, Covid-19 Research Grant, USD 200,000, 2020/2021
- (iii) Analytical Chemistry Trust Fund (ACTF), mobility grant (19/600504/12), USD 5,800, 2019/2020
- (iv) Jaramogi Oginga Odinga University Small Grants for Research (JSGR), USD 1,600, 2017/2018

#### **c) Visiting Fellowships**

- i) Jan to Apr 2020: Visiting Research Fellow under ACTF mobility grant at Nanoscale electrochemistry research group, School of Chemistry, Trinity College, the University of Dublin, Ireland.
- ii) June 2019: Visiting Researcher at Electrochemistry research group, Department of Chemistry, Cape Peninsula University of Technology (CPUT), Cape Town, South Africa.
- iii) July 2019: Visiting Researcher at SensorLab, Department of Chemistry, University of the Western Cape (UWC), Cape Town, South Africa.

### **Postgraduate Supervision**

<b>Name of student</b>	<b>Project title</b>	<b>Degree</b>
Caleb O. Duya (CPUT/JOUST)	Ultrasensitive Silver-Gold Bimetallic Interdigitated Array Sensor for Detection of <i>Escherichia coli</i> and <i>Salmonella typhimurium</i>	PhD (On-going)
Odongo S. Adongo (JOUST)	<i>Physalis peruviana</i> leaf extract mediated synthesis of gold nanoparticles and their cytotoxicity, antibacterial and wound healing effects under <i>in vitro</i> condition	PhD (On-going)
Wina Mutanekelwa (JOUST)	Evaluation of the potential of selected biochar as Cadmium adsorbents in black soldier fly (BSF) larvae	MSc ( <b>Successfully defended</b> )

### **Postgraduate Examination**

#### **External Examiner**

- (i) Tswellang Mgiijima (MSc, University of Western Cape), 'Red wine gold nanoparticles for wound healing' 3657027 (**Completed**).

#### **Internal Examiner**

- (i) Benjamin Chanda (MSc, JOUST), 'Forage preference identification of wild edible caterpillars (*Gynanisa maja*) and Plant chemicals influencing their feeding for enhancing food security' A451/4323/2018 (**Successfully defended**)

- (ii) Tehillah Mwale (MSc, JOOUST), ‘The potential for domesticating Huntsman spider (*Spariolenus aratta*) and its nutritional profile as feed for improved food security’ A451/4141/2019 (**Successfully defended**)
- (iii) Danstone Ochieng Aboge (MSc, JOOUST), ‘Effects of Substituting Soybean flour with cricket flour (*Acheta domesticus* (L.) on the characteristics and acceptability of complementary porridge’ A451/4258/2018 (**Successfully defended**)
- (iv) Otieno Eddy Paul (MSc, JOOUST), ‘Optimizing Production of Common Housefly (*Musca domestica*) prepupae reared on broiler by-products as animal feed’ A451/4264/2018 (**Successfully defended**)

### **Current research Interests**

- Synthesis and characterization of nanomaterials using electrochemical methods
- Nanoscale electrochemistry of novel nanomaterials
- Surface functionalization of electrodes for sensing and catalysis
- Application of sensors in detection and monitoring of pharmaceuticals and other water pollutants

### **Professional Affiliations**

- a) Royal Society of Chemistry (RSC)
- b) Kenya Chemical Society (KCS)
- c) Kenya DAAD Scholars Association (KDSA)

### **Referred /Peer Reviewed Journal Publications**

- (i) Stephen Adongo Odongo, **Fredrick Oluoch Okumu**, Solomon Omwoma Lugasi, Martin Opiyo Onani and Stephen Gaya Agong. (2022). Biogenic Synthesis of Gold Nanoparticles from *Physalis peruviana* and Application in Wound Healing. Journal of Chemistry, 2022, <https://doi.org/10.1155/2022/9034840>.
- (ii) Shehu Shagari Awandu, Alfred Ochieng, Benson Onyango, Richard Odongo Magwanga, Pamela Were, Angeline Ochung, Marceline Adhiambo Oloo, Fredrick Ade, Shirley Lidechi, **Fredrick Okumu**, Fredrick Ogutu, Dorothy Awuor, Joy Nyangasi Kirungu, Francis Orata Omoto, Justine Midega, Bonface Oure, Regina Nyunja, Eric Muok, Clayton Onyango, Steve Munga, Benson Estambale. High seroprevalence of Immunoglobulin G (IgG) and IgM antibodies to SARS-CoV-2 in asymptomatic and symptomatic individuals amidst vaccination roll-out in western Kenya. (Pre-print) medRxiv. DOI: 10.1101/2022.07.27.22278095.
- (iii) Wina Mutanekelwa, **Fredrick Okumu** and Darius Andika. (2022). Adsorption Behaviour of Selected Biochar for Cadmium removal in Black Soldier Fly (*Hermetia Illucens*) Larvae Fed on Contaminated Organic Waste. *Journal of Material Sciences & Manufacturing Research*. 3(3), 1-6. DOI: doi.org/10.47363/JMSMR/2022(3)135.
- (iv) Odongo, S. A., Lugasi, S. O., **Okumu, F. O.**, Onani, M. O., Lagat, S. C., & Agong, S. G. (2022). Biogenically Synthesized Silver/Gold Nanoparticles, Mechanism and their Applications: A Review. *Asian Journal of Chemical Sciences*, 11(2), 1-18. <https://doi.org/10.9734/ajocs/2022/v11i219116>.
- (v) **Fredrick O. Okumu**, Bongwiwe Silwana, Mangaka C. Matoetoe, Application of MWCNT/Ag-Pt Nanocomposite Modified GCE for the Detection of Nevirapine in Pharmaceutical Formulation and Biological Samples, *Electroanalysis*, 2020: 32(12), 3000-3008.
- (vi) **Fredrick O. Okumu** and Mangaka C. Matoetoe, 2019. Mechanism and Kinetics

for adsorption of Indigo Carmine. Modern and Traditional Methods of Water Resource Management in Africa; Water Perspectives in Emerging Countries Proceedings), Exceed Swindon Workshop Durban, South Africa, 5-9 May, 176-178.

- (vii) **Fredrick O. Okumu** and Mangaka C. Matoetoe, 2017. Electrochemical and optical band gaps of bimetallic silver-platinum varying metal ratios nanoparticles. *African Journal of Pure and Applied Chemistry*, 11(1): 1-8.
- (viii) **Fredrick Okumu**, Mangaka Matoetoe. 2016. Electrochemical characterization of silver-platinum bimetallic nanoparticles. *Journal of Nano Research*, 44: 114-125.
- (ix) Khesoue Malefetsane, Mangaka Matoetoe, **Fredrick Okumu**. 2016. Potential of silver nanoparticles functionalized polyaniline as an electrochemical transducer. *Journal of Nano Research*, 44: 21-34.
- (x) M.P. Khesoue, **F.O. Okumu**, M.C. Matoetoe. 2016. Development of silver functionalized polyaniline electrochemical immunosensor for polychlorinated biphenyls. *Analytical Methods*, 8: 7087-7095.
- (xi) **Fredrick Okumu**, Mangaka Matoetoe, 2016. Kinetics and Morphological analysis of Silver Platinum bimetallic nanoparticles. *Acta Metallurgica Sinica (English letters)*, 29(4): 320-325.
- (xii) Sneha Mohan, **Fredrick Okumu**, Oluwatobi Oluwafemi, Mangaka Matoetoe and Omotayo Arotiba, 2016. Electrochemical Behaviour of Silver Nanoparticle-MWCNTs Hybrid Nanostructures Synthesized via a Simple Method. *International Journal of Electrochemical Science*, 11: 745-753.
- (xiii) Mangaka Matoetoe, **Fredrick Okumu**, Connie Maphale and Olalekan Fatoki, 2015. Thermal and Spectroscopic Dynamics of Titanium Oxide Functionalized Polyaniline Coated Sawdust. *Asian Journal of Chemistry*, 27(4): 1411-1416.
- (xiv) **Fredrick Okumu**, Mangaka Matoetoe, Olalekan Fatoki, 2013. A novel polyaniline titanium oxide sawdust composite adsorbent for polychlorinated biphenyls. *Science Journal of Chemistry*, 1(3): 29-37.

### Conferences Presentations

- (i) First Commonwealth Chemistry Congress, Partnership for the Goals, 18<sup>th</sup> – 20<sup>th</sup> May 2021. Virtual. Electrochemical transduction based on silver nanomaterials. **Paper presented:** Fredrick Okumu and Mangaka Matoetoe.
- (ii) Commonwealth Chemistry Posters-Building the Partnership. Bridging Chemistry Across the Commonwealth to tackle the SDGs, 25<sup>th</sup> – 27<sup>th</sup> August 2020. Virtual. Electrochemical transduction based on silver nanomaterials. **Poster presented:** Fredrick Okumu.
- (iii) The 2nd Jaramogi Oginga Odinga University of Science and Technology (JOUST) International Conference. 2019. Title: Value addition of the JOUST anti-bacterial liquid hand wash. **Paper presented:** Angeline Orwa and Fredrick Okumu.
- (iv) The Exceed-Swindon Regional Experts Workshop on Modern and traditional methods of water resource management in Africa, Durban, South Africa. 5<sup>th</sup> to 9<sup>th</sup> May 2019. **Paper presented:** Fredrick Okumu and Mangaka Matoetoe. Title: Mechanism and Kinetics for the adsorption of Indigo Carmine with Polyaniline.
- (v) The 5<sup>th</sup> Humboldt Kolleg on The Role of Alumni Networks in Mentorship and Collaboration in Multidisciplinary Research: Foundation for Kenya's Vision 2030". 19<sup>th</sup> to 21<sup>st</sup> June, 2018. Nanyuki, Kenya. **Paper presented:** Fredrick Okumu and Mangaka Matoetoe. Title: An electrochemical transducer based on silver nanoparticles functionalized polyaniline.
- (vi) 9<sup>th</sup> International KCS conference and Exhibition 'The Role of Chemistry in Inventing a Sustainable Future', USIU, Nairobi, Kenya. 9<sup>th</sup> - 12<sup>th</sup> May 2017.

- Paper presented:** Fredrick Okumu, M.C. Matoetoe. Title: Optical band gap and X-ray diffraction of bimetallic silver-platinum nanoparticles.
- (vii) The 2<sup>nd</sup> International Conference on Sensors, Materials and Manufacturing (ICSMM 2016) Nha Trang, Vietnam. 26<sup>th</sup> -28<sup>th</sup>, February 2016. **Paper presented: F. Okumu, M. C. Matoetoe.** Title: Optical and Electrochemical Band gaps of varying ratios of Ag-Pt bimetallic nanoparticles.
  - (viii) 3<sup>rd</sup> International Symposium on Electrochemistry, “Materials, Analytical and Physical Electrochemistry Today” (MAPET’15)”. ElectrochemSA, SACI Bellville, South Africa. 26<sup>th</sup> – 28<sup>th</sup> May 2015. Paper presented: **F. O. Okumu, M. C. Matoetoe.** Title: Electrochemical characterization of Silver-Platinum Bimetallic Nanoparticles.
  - (ix) Annual Postgraduate Conference 2013, Cape Peninsula University of Technology, Cape Town, South Africa. 11<sup>th</sup> November, 2013. **Paper presented: F. O. Okumu, M. C. Matoetoe.** Synthesis and characterization of bimetallic silver and platinum alloy nanoparticles for development of amperometric sensor.
  - (x) The 2<sup>nd</sup> International Symposium on Electrochemistry, “Electrochemistry for Energy” 19<sup>th</sup> - 20<sup>th</sup> July 2012. African Routes Conference Centre, University of the Western Cape, Bellville, South Africa. **Poster presented: F. O. Okumu, M. C. Matoetoe, E. Iwuoha** Electrochemical determination of selected polychlorinated biphenyls.
  - (xi) The U6 conference. “Joint Conference on Science and Development in Africa”. 25<sup>th</sup> - 28<sup>th</sup> June 2012. Cape Peninsula University of Technology, Cape Town, South Africa. **Paper presented: F. O. Okumu, M. C. Matoetoe, O. S Fatoki and T. A. Akenga.** Spectroscopic and morphological characterization of polyaniline coated pine sawdust.

#### **Invited /Guest Lecture**

- i) Electrochemical sensors and applications, Trinity College, University of Dublin, Ireland, 16<sup>th</sup> and 20<sup>th</sup> March 2020.

#### **Professional Development Training/Workshop**

- (i) Workshop on Sustainable Biosafety and Biosecurity Management in Kenya, The Technical University of Kenya, **Virtual**, 19<sup>th</sup> – 22<sup>nd</sup> April 2022.
- (ii) Workshop on I-StAR: Introduction to Statistical Analysis with R, Pwani University, **Virtual**, 3<sup>rd</sup> – 7<sup>th</sup> May 2021.
- (iii) Workshop on Inclusion and Diversity in Chemical Sciences, Enhancement and promotional activities for chemical sciences Career and the reduction of gender gap in enrolment for chemistry courses, 17<sup>th</sup> and 29<sup>th</sup> January 2021.
- (iv) Short course on QMS ISO/IEC 17025-2017 at Kisumu Hotel, 25<sup>th</sup> – 26<sup>th</sup> February 2021.
- (v) Workshop on Management of Internationalization for Young University Academic and Administrative Staff”, Dedan Kimathi University of Technology, **Virtual**, 20<sup>th</sup> - 24<sup>th</sup> July 2020
- (vi) Technology enabled learning (TEL) implementation workshop, JOOUST, 17<sup>th</sup> – 21<sup>st</sup> June 2019.
- (vii) Workshop on ‘Research Administration and Grant Writing’ University of Nairobi, Kenya. 12<sup>th</sup> - 14<sup>th</sup> March, 2019.
- (viii) Workshop on Developing Blended Learning Courses using Moodle, JOOUST Kisumu campus, 29<sup>th</sup> – 31<sup>st</sup> January 2019.
- (ix) Workshop on ‘Gaps and lapses in Laws and Policies for Chemical Management Systems towards Responsible Production and Consumption in Kenya’ Maseno University, Kisumu, Kenya. 6<sup>th</sup> - 8<sup>th</sup> March, 2019.

- (x) One Health Alumni workshop, Pwani University, Kilifi, Kenya. 17<sup>th</sup> – 19<sup>th</sup> December 2018.
- (xi) Workshop on the ‘Role of Supervisors in Quality Research and Proposal Writing’, Maseno University, Kisumu, Kenya. 18<sup>th</sup> - 19<sup>th</sup> October, 2018.
- (xii) Chemical Security Vulnerability Assessment Training in Western Kenya, at Kisumu, Kenya. 4<sup>th</sup> - 7<sup>th</sup> July, 2017.
- (xiii) Chemical Security Training Workshop for Chemical Industries in Kenya, Technical University of Kenya, Nairobi, Kenya. 17<sup>th</sup> - 19<sup>th</sup> January, 2017.
- (xiv) Nanotechnology Research Seminar. Faculty of Engineering, Cape Peninsula University of Technology, Cape Town, South Africa. 11<sup>th</sup> April, 2014. Paper presented: **F. O. Okumu**, M. C. Matoetoe. Synthesis and characterization of bimetallic silver and platinum alloy nanoparticles for development of amperometric sensor.

### **Community /Outreach Services**

- (i) Technical and Vocational Education and Training (TVET), Western Region, Kenya Judge/Applied Science Judge/Assess various science projects and exhibitions, Western Kenya, 2018 – Present

### **Consultancy**

- (i) Technical expert, JOOUST Soap detergent unit

### **Co-curricular Activities**

- Pool table games, chess, horse riding

### **Referees**

1. Prof. Mangaka C. Matoetoe,  
Associate Professor, Department of Chemistry,  
Cape Peninsula University of Technology (CPUT),  
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2. Prof. Martin Onani,  
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3. Prof. Bernard Okello,  
Associate Professor,  
School of Biological, Physical, Mathematics and Actuarial Sciences,  
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