

Henry Agbe
Kumasi, Ghana
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EDUCATION:

2018- 2021- PhD Engineering (Biomaterials Science and Engineering), University of Quebec (UQAC).

RESEARCH: *Antimicrobial aluminium surfaces*

COURSES OFFERED: Corrosion and degradation of materials	Grade: A (93%)
Surface engineering	Grade: A+ (100%)
Special course (Surface Eng. of biomaterials)	Grade: A+ (100%)
Doctoral Exams	Grade: S (Success)
Cumulative Average	4.15/4.30 (97.8%)
Thesis	Grade: Excellent

Jan 2016 – 2017 PhD Materials Science and Engineering-University of Ghana.

RESEARCH: *Novel Nanostructured Photocatalysis for Oil Spill and Cyanide Detoxification.*

COURSES OFFERED: Micro and Nanomaterials	Grade: B+ (70 - 79%)
Project Management	Grade: B+ (70 - 79%)
Advanced Seminar Presentation	Grade: B+ (70 - 79%)

2010 - 2011 **M.phil Degree in Micro & Nanotechnology Enterprise, University of Cambridge.UK**

RESEARCH: *New Methodologies for Assessing the Eco-toxicology of Nano- Scale Materials.*

COURSES OFFERED: Characterization Techniques; Nanomaterials; MEMS Design; Micro and Nanofabrication Design; Nano electrochemistry; Semiconductor Materials for Nanostructures; Physics at the Nanoscale; Nano biotechnology; Nano chemistry; Nano-Self Assembly; Science Communication in Media Business and Research; Societal & Ethical Dimensions of Micro and Nanotechnology; and Nurturing and Managing Innovation in Science.

Grade: Pass (60 - 74%)

Aug 2010 – Sept 2010 **Pre-sectional course: English for Academics Purpose. Grade: Pass (80 – 100 %),** University of Cambridge. UK.

2004 - 2008 **B.Sc (Hons) Degree in Minerals Engineering, Western University College of KNUST (UMaT) Ghana.**

RESEARCH: *A study on the use of cocoa husk-ash as a flux component in gold Smelting.*

COURSES OFFERED: hydrometallurgy, pyro metallurgy, physical metallurgy, Extractive metallurgy, Computer Programming, Metallurgical Plant Design, Process Control and Instrumentation, Applied Electricity, Computer Applications in Minerals Engineering, Thermodynamics, Fluid Mechanics, Heat transfer, Physical, Mineral and Analytical Chemistry, etc.

Grade: First Class Honours (70 – 100 %)

2000 - 2003 **Teachers' Certificate St Joseph's Teacher Training College, Bechem-Ghana**

Grade: Distinction (80-100 %)

WORK EXPERIENCE

- 2023-Date Lecturer, Department of Materials Engineering, KNUST.
- 2021- 2023 Postdoctoral fellow, Laboratory for Biomaterials and Engineering, Laval University.
- 2016 - 2017 Nanotechnology Tutor- Bucksmore Education Summer School-England, UK.
- 2016- 2017 Invigilator- Wolfson College - University of Cambridge- England, UK.
- 2016- 2017 PhD Materials Science and Engineering (University of Ghana-Discontinued)

RESPONSIBILITIES (PHD and POSTDOC):

- Antimicrobial biomaterial synthesis: polymeric Ag-based nanocomposite synthesis, electrochemical deposition, Sol-Gel and precipitation synthesis, hydrothermal and solvothermal synthesis, polymer (RAFT & ATRP) synthesis, etc.
- Investigating mechanisms of nanoscale superhydrophilic and durable superhydrophobic active surfaces for modulating favourable biological response.
- Microbiology- Cell Culture, antimicrobial susceptibility testing, anti-biofouling and biofilm inhibition Testing, etc,
- Material Characterisation: XRD, XPS, BET, EDS, SEM, TEM, FTIR, UV-Vis etc.
- Surface Engineering of metallic biomaterials-Chemical etching, anodization, CVD, PVD, antimicrobial coatings etc.
- Electrochemical Characterization: Open circuit potential (OCP), electrochemical impedance spectroscopy (EIS), Potentiodynamic Polarization (PDP), Cyclic voltammetry (CV), chronoamperometry (CA) etc.
- Metallography and surface finishing: Mechanical polishing, Electro polishing etc.
- Validation of adhesion coatings for spinal, dental and vascular implants applications.

2012- 2016

LECTURER (ASSISTANT HOD): ALL NATIONS UNIVERSITY COLLEGE.

RESPONSIBILITIES:

- Taught assigned University College courses.
- Completed annual departmental administrative duties.
- Participated in regular University College faculty assembly meetings and other events.
- Supervised student research in area of expertise.

2010- 2011

INTERNSHIP- Research scientist: M.Phil Project, National Physical Laboratory- Teddington, Middlesex-U.K.

RESPONSIBILITIES:

- Developing new methodologies for assessing eco-toxicology of nano-scale materials.

2010- Mar 2011:

PROJECT MANAGEMENT- Judge Business School, University of Cambridge, U.K.

RESPONSIBILITIES:

- Investigation into the feasibility of adopting an environmentally friendly ink for Domino Printing Sciences plc-UK.

ACHIEVEMENT:

- Performed assigned role satisfactorily and achieved target within the stipulated time.

2009 – Jan 2010:

SHIFT SUPERVISOR, GOLDEN STAR (BOGOSO/PRESTEA) LTD, GHANA.

RESPONSIBILITIES:

- Operation of Rotating Biological Contactor (RBC).
- Monitoring, troubleshooting, instrumentation and control.

ACHIEVEMENT:

- The budget allocations and estimated costs were met.
- The project's feasibility was achieved within stipulated time.
- Achieved 99%, 97.2%, 94.5%, 89.8% degradation of Free CN, SCN, Total CN and WAD CN, respectively.

2008- 2009

TRAINEE METALLURGIST, GOLDEN STAR (BOGOSO/PRESTEA) LTD, GHANA.

RESPONSIBILITIES:

- Organized plant personnel and coordinated operations to achieve set production targets.
- Trained to supervisory level in Crushing (Gyratory and Jaw crusher), Milling and Classification (450tph SAG and Ball mill circuit), Flotation, Bioxidation, CIL and Elution Operations.

ACHIEVEMENT:

- Developed procedure for collector strength determination.
- Performed laboratory work for cyanide detoxification.

PROFESSIONAL AFFILIATIONS 2005- Date Member, Ghana Institution of Engineers (GhIE).

AWARDS:

2022-June, Quebec Government FRQNT Postdoctoral Fellowship

2021-August, In recognition of excellence in research and most prolific publishing graduate student

2018- June Best poster award Journée des étudiants du REGAL

2018-2021- Fonds de recherche du Québec - Nature et technologies (FRQNT), PhD scholarship

2016-2017 Commonwealth Split Site (PhD) Scholarship: University of Cambridge.

2017-2017 Wolfson College Research Grant- University of Cambridge.

2013-2014 Cambridge-Africa Alborada Research Fund

2012-2013 Department of Health's Bursary- Nanomedicine, Cranfield University

2010-2011 Cambridge-Commonwealth Shared-Scholarship Award (M.Phil. Scholarship)

2000-2003 Best Student Award -Religious and Moral Education-Josco

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KEY SKILLS/PUBLICATIONS/CONFERENCES/RESEARCH INTEREST:

- Biomaterial synthesis (Metallic, ceramic, polymeric and nanocomposites)

- Surface engineering of Biomaterials
- Advanced material characterisation
- Electrochemical characterization
- Antimicrobial coatings (polymeric, metallic, superhydrophobic and photocatalytic materials)
- Microbiology

PUBLICATIONS

Published or accepted

1. **H. Agbe**, D.K. Sarkar, X.G. Chen, Anodized aluminum surface with topography-mediated antibacterial properties, *ACS Biomater. Sci. Eng.* 8, 3, 2022, 1087–1095 (*Q1 journal, high impact IF 4.7*) <https://doi.org/10.1021/acsbiomaterials.1c01485>.
2. E. Nyankson, **H. Agbe**, G. K. S. Takyi, Y. D. Bensah, D. K. Sarkar Recent advances in nanostructured superhydrophobic surfaces: fabrication and long-term durability challenges, June 2022 *Current Opinion in Chemical Engineering* 36:100790 (*Q1 journal, high impact IF 5.2*) DOI: 10.1016/j.coche.2021.100790
3. **H. Agbe**, D.K. Sarkar, X.G. Chen, Electrochemically synthesized silver phosphate coating on anodized aluminum with superior antibacterial properties, *Surface and Coating Technology*, volume 428,2021,127892, ISSN 0257-8972, (*Q1 journal, high impact IF 4.2*) <https://doi.org/10.1016/j.surfcoat.2021.127892>
4. **H. Agbe**, D.K. Sarkar, X.G. Chen, N. Faucheux, G. Soucy, J.-L. Bernier, Silver-polymethylhydrosiloxane nanocomposite coating on anodized aluminum with superhydrophobic and antibacterial properties, *ACS Appl. Bio Mater.*, 3, 7 (2020) 4062–4073. (*Q1 journal, high impact, but not yet indexed*) <https://doi.org/10.1021/acsabm.0c00159>.
5. **H. Agbe**, D. K. Sarkar, X.-G. Chen, Tunable Superhydrophobic Aluminum surfaces with Anti-biofouling and Antibacterial Properties, *Coatings* 2020, 10 (10), 982. (*Q2 journal, IF 2.8*). <https://doi.org/10.3390/coatings10100982>.
6. D. Dodoo-Arhin, E. M. Etchu, S. K. O. Ntwampe, E. N. Malenga, E. Fosso-Kankeu, B. Agyei-Tuffour, E. Nyankson, A. Yaya, **H. Agbe**, Synthesis of Nanostructured Cupric Oxide for Visible Light Assisted Degradation of Organic Textile Dye Pollutants, *Co-engineering*, Vol.8,2021 (*Q2 journal, high impact but not yet indexed*) <https://doi.org/10.1080/23311916.2021.1920563>
7. D. Dodoo-Arhin, E. M. Etchu, B. Agyei-Tuffour, E. Nyankson, J. D. Obayemi, A. A Salifu, A. Yaya, **H. Agbe**, W. O. Soboyejo Modified nanostructured titania photocatalysts for aquatic disinfection applications, September 2020 *Materials Today: Proceedings* 38(12) (*Q2 journal, high impact but not yet indexed*) DOI: 10.1016/j.matpr.2020.07.710
8. **H. Agbe**, E. Nyankson, N. Raza, D. Dodoo-Arhin, A. Chauhan, G. Osei, V. Kumar, K.-H. Kim, Recent advances in photoinduced catalysis for water splitting and environmental applications, *Journal of Industrial and Engineering Chemistry*, 72 (2019) 31-49. (*Q1 journal, IF 6.1*). <https://doi.org/10.1016/j.jiec.2019.01.004>.
9. **H. Agbe**, N. Raza, D. Dodoo-Arhin, R.V. Kumar, K.-H. Kim, A simple sensing of hazardous photo-induced superoxide anion radicals using a molecular probe in ZnO-Nanoparticles aqueous medium, *Environmental research*, 176 (2019) 108424. (*Q1 journal, IF 6.5*). <https://doi.org/10.1016/j.envres.2019.03.062>.
10. **H. Agbe**, N. Raza, D. Dodoo-Arhin, A. Chauhan, R.V. Kumar, H₂O₂ rejuvenation-mediated synthesis of stable mixed-morphology Ag₃PO₄ photocatalysts, *Heliyon*, 4 (2018) e00599. (*Q1 journal, IF 1-2*). <https://doi.org/10.1016/j.heliyon.2018.e00599>

11. D. Dodoo-Arhin, F.P. Buabeng, J.M. Mwabora, P.N. Amaniampong, **H. Agbe**, E. Nyankson, D.O. Obada, N.Y. Asiedu, The effect of titanium dioxide synthesis technique and its photocatalytic degradation of organic dye pollutants, *Heliyon*, 4 (2018) e00681. (*Q1 journal, IF 1-2*). <https://doi.org/10.1016/j.heliyon.2018.e00681>.
12. W. Raza, N. Raza, **H. Agbe**, R. Kumar, K.-H. Kim, J. Yang, Multistep sequestration and storage of CO₂ to form valuable products using forsterite, *Energy*, 155 (2018) 865-873. (*Q1 journal, IF 7.1*). <https://doi.org/10.1016/j.energy.2018.05.077>.
13. N. Raza, W. Raza, S. Madeddu, K.-H. Kim, Synthesis and characterization of amorphous precipitated silica from alkaline dissolution of olivine, September 2018, *RSC Advances* 8(57):32651-32658 (*Q1 journal, IF 3.4*)DOI: 10.1039/C8RA06257A.
14. N. Raza, K.-H. Kim, **H. Agbe**, S.K. Kailasa, J.E. Szulejko, R.J. Brown, Recent advances in titania-based composites for photocatalytic degradation of indoor volatile organic compounds, *Asian Journal of Atmospheric Environment*, 11 (2017) 217-234. (*IF 0-1*). <https://doi.org/10.5572/ajae.2017.11.4.217>.
15. **H. Agbe**, C. Ducati, The Strange world of the Nanoscale. *Applied Thought (Multidisciplinary Approach)*, 3 (2015) 235-244. (*Popularization and awareness article*)
16. **H. Agbe**, C. Ducati, the prospect of using photocatalytic metal oxide nanoparticles for degrading oil spill-An innovative Approach in Environmental Remediation. *Applied Thought (Multidisciplinary Approach)*, 3 (2013) 35-43. (*Popularization and awareness article*)

Submitted and under review

1. **H. Agbe**, D. K. Sarkar, X.-G. Chen, N. Faucheux, G. Soucy, J. L. Bernier, Silver-polymethylhydrosiloxane-quaternary ammonium on anodized aluminum with excellent self-disinfection property, (Submitted, March 2022).

In preparation but not yet submitted

1. **H. Agbe**, D. K. Sarkar, X.-G. Chen, N. Faucheux, G. Soucy , J. L. Bernier, Silver-based nanocomposite coatings on aluminum with tunable antibacterial and antifouling properties, (*Ready to be submitted to Coatings*).
2. **H. Agbe**, D. K. Sarkar, X.-G. Chen, G. Soucy , J. L. Bernier, Onion-extract mediated silver synthesis on aluminum with antibacterial and self-disinfection properties, (*In preparation-Yet to be submitted*).
3. **H. Agbe**, D.K. Sarkar, X. G. Chen, S. Noormohammed. Antibacterial aluminum surfaces for curbing the prevalence of healthcare-associated infections (HCAI): Prospects and Challenges, (*In preparation-Yet to be submitted*).

Book Chapter:

Biomaterials handbook (in preparation)

Chapter title: Biomedical Co-Cr-based alloys

Course Taught (Nov 2021 to Date)

A module on Biomaterials for implants and Artificial Organs, inter-faculty Graduate level course

CONFERENCES:

1. Oral Presentation: 7th International Conference and Exhibition on Advanced and Nanomaterials –Montreal, Canada, 12-14th August, 2019

2. Oral Presentation: Journée des étudiants du REGAL | JER2019- Laval University, Canada October 2019.
3. Poster Presentation: Journée des étudiants du REGAL | JER2019- Laval University, Canada October 2019.
4. Poster Presentation: Journée des étudiants du REGAL | JER2018- McGill University, Canada June 2018.
5. Oral Presentation: 2nd International Conference on New Photocatalytic Materials for Environment, Energy and Sustainability-Slovenia - July 2017
6. The International Oil Spill Conference (IOSC)- Long Beach, California, USA-May 2015
7. Poster Presentation: Wolfson Research Event- University of Cambridge, England.-Feb 2017
8. Oral Presentation: National Physical Laboratory- Teddington, Middlesex-UK. – May 2011

STUDENTS RESEARCH WORK SUPERVISED:

- Effects of CO₂-atmospheres and degradation medium on static corrosion of pure zinc (Graduate level)
- Electroforming process of Fe-Mn alloys using deep eutectic solvents (Graduate level)
- ZnO and TiO₂ photo catalyst for degrading methylene blue dye in a UV-visible photocatalytic reactor (Undergraduate level)
- A study on the use of Nanostructured ZnO and TiO₂ Photo catalyst for remediating oil spill (Undergraduate level).
- A Study on the use of metabolites of *P. Aeruginosa* bacterium for EOR (Undergraduate level)
- An Economic Study of Steam Drive Thermal Flooding Enhanced Oil Recovery (Undergraduate level)
- An Economic Study of CO₂ Flooding Enhanced Oil Recovery (Undergraduate level)

COMPUTER/TECHNICAL/OTHER SKILLS:

MS office suite, MATLAB, Origin, Auto-CAD, Image J, Chemdraw, Edraw etc.

OTHER INVOLVEMENTS

2018-Date: Reviewer for: Results in Physics (RINP); Materials Today: Proceedings; Scientific African.
 2016-2017: Vice President, Innovation Forum-Cambridge University Branch.
 2016-2017: Organizing Sec., Cambridge Ghanaian Students Union University of Cambridge, U.K
 2016-2017: Publicity Sec., Wolfson Research Event, Wolfson College, University of Cambridge.
 2014-Date: Mentor- Oxbridge Africa Mentorship Programme.
 2013-2016: Assistant Head of Department, Oil and Gas Engineering, All Nations University College
 2013-2016: Internal Moderator and Auditor of Examinations Results-Oil and Gas Eng. Dept ANUC.
 2012-Date: Eastern Regional Coordinator-Leadership International
 2012-Date: Geohydroprobe Consults.
 2010-2011: Class-Representative, M. Phil Micro and Nanotechnology -Cambridge.UK
 2010-2011: Publicity Sec., Cambridge Ghanaian Students Union University of Cambridge,
 2008-2009: President, National Service Personnel, Golden Star Bogoso/Prestea Mine, Ghana. 2006–
 2007: Vice President, Mining & Minerals Engineering Students Association. UMaT-Ghana.

REFEREES:

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