Curriculum Vitae

Michael Gyamerah, Ph.D.

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SUMMARY:

University and College teaching experience in undergraduate Chemical Engineering courses, Biotechnology and Bioprocess Engineering, General and Industrial Chemistry, and Fermentation Technology, and a graduate course in Transport Phenomena. Proven ability to develop and teach courses in Biotechnology and Bioprocess Engineering. Extensive experience in biological process research and development. Proven hands-on skills in fungal fermentations for heterologous protein and organic acid production, and applied microbial physiology and, enzymology and biocatalysis. Trained and mentored students in undergraduate bioprocess engineering and fermentation technology research, and supervised a masters thesis on biocatalysis.

EDUCATION:

Ph.D. in Biochemical Engineering: 1984

Loughborough University of Technology, United Kingdom.

Thesis Topic: Ethanol by continuous fermentation using a combination of immobilized yeast and liquid-liquid extraction.

BS in Chemical Engineering: 1977

University of Science & Technology, Kumasi, Ghana.

Design Project Topic: Vinyl chloride manufacture using acetylene.

HONORS & AWARDS:

- Royal Norwegian Council For Scientific & Industrial Research (*NTNF*) Postdoctoral Fellowship, 1988-1990.
- British Commonwealth Academic Scholarship, 1980 -1983.

WORK EXPERIENCE:

Prairie View A & M University, *Chemical Engineering Department*, Prairie View, TX:

September 2007 – Present

Associate Professor of Chemical Engineering: Member of the Chemical Engineering faculty, engaging in teaching, research and service activities including (1) course development and instruction, (2) research proposal development, (3) research project execution and training undergraduate research (4) student advising, counseling, and mentoring, (5) committee participation, and (6) professional and personal development.

September 2001 – August 2007

Tenure-track Assistant Professor of Chemical Engineering: Member of the Chemical Engineering faculty, engaging in teaching, research and service activities including (1) course development and instruction, (2) research proposal development, (3) research project execution and training undergraduate research (4) student advising, counseling, and mentoring, (5) committee participation, and (6) professional and personal development.

Graduate Students Supervised and Advised:

- Kehinde Seun Bankole, "Solvent tolerance of a recombinant *Escherichia coli* strain for aryl oxidations", Masters Thesis, August 2006 (Chair, Student Advisory Committee)
- Colin Akoto Kwabbi, "New results for flash point measurements and prediction for flammable binary liquid mixtures", Masters Thesis, December 2005 (Member, Student Advisory Committee)
- Olurotimi Enitan Sonaike, "Measurement and prediction of the flash point of binary ideal and non-ideal solutions", Masters Thesis, December 2004 (Member, Student Advisory Committee)
- Gbenga Ajiboye, "Economic and environmental impact assessment of alpha-naphthol production", Masters Thesis, December 2007 (Member, Student Advisory Committee)

Funded Research as PI:

- Biomedical and Behavioral Mini-Grant Research Award (NIH) of $7000.00 (March 2002 – December 2003) for the Research Proposal "Bioprocessing strategies for improving bio-active protein production by *Aspergillus* species", prepared and submitted with Dr. Raul Cuero (Research Scientist and Distinguished Professor of Microbiology at the Agricultural Research Laboratory, PVAMU) as Co-Investigator, the in the Fall 2001 semester.
- National Science Foundation (NSF) Award No. BES-0421287 of $201,116.00 (September 1, 2004 - February 28, 2006) for the Major Research Instrumentation proposal titled "Acquisition of research instrumentation for applied research and training in biotechnology and bioprocess engineering" presented in the Spring 2004 semester. Dr. Jorge Gabitto and Dr. Felecia Nave of the Chemical Engineering Department and Drs. Aderemi Oki and Gloria Regisford of the Chemistry and biology Departments respectively were co-PIs.
- United Negro College Fund Special Programs Corp., Faculty Development Support Award of $10,000.00 (May 2005 – June 2006). The research proposal titled "Solvent Tolerant Enzyme and Microbial Systems for Biocatalytic Transformations" was presented in the Fall 2004 semester.

Funded Research Proposals as co-PI

- NSF award of $1 million award (August 2006 – August 2011) for collaborative research with Dr. Raul Cuero of CARC as PI, as part of the newly funded $16 million NSF Synthetic Biology Engineering Research Center (SynBERC) with University of California, Berkeley as

lead Institution, and Massachusetts Institute of Technology, Cambridge, MA, University of California, San Francisco, CA and Havard University, Cambridge, MA as Core Partner Institutions. The research proposal titled "Study of bioenergetics of autotrophic bacteria in relation to their growth and metabolic networks using electro-chemical and optical sensors: Interactive effects of biological and chemical agents in the environment" was presented in the Spring 2005 semester

- Prepared and presented as co-PI with Drs. Irvin W. Osborne-Lee and Felecia Nave of the Chemical Engineering Department in the Spring 2006 semester an NSF HBCU undergraduate program (HBCU-UP) Grant HRD-0636409 of $149, 718.00 proposal titled "Targeted Infusion Project: Development of Bioengineering Concentration in the Department of Chemical Engineering PVAMU".

Multi-institutional and multidisciplinary research collaboration:

- Member of a multi-disciplinary research group from Prairie View A & M University Chemical Engineering Department, the Department of Chemical and Biochemical Engineering and Division of Medicinal & Natural Products Chemistry at the University of Iowa and the University of Kansas, working on "Solvent tolerant enzyme and microbial systems for aryl oxidations" of the Biocatalyis Test Bed of the NSF Center for Environmentally Beneficial Catalysis (CEBC). A graduate student provided with funding was supervised to complete a masters thesis.

- Member of Prairie View A & M University team (represented by CARC and the Chemical Engineering Department) in the NSF Synthetic Biology Engineering Research Center (SynBERC) with University of California, Berkeley, Massachusetts Institute of Technology, Cambridge, MA, University of California, San Francisco, CA and Havard University, Cambridge, MA, and Lawrence Berkeley National Laboratory, Berkeley, CA. SynBERC kicked off on August 21, 2006.

Michigan State University, *Department of Chemistry*, East Lansing, MI: **2000 - 2001**

Research Associate: (1) Taught graduate students hands-on techniques and procedures for succinic acid fermentation by a recombinant *Escherichia coli* in a 2-liter anaerobic fed-batch fermentor

(2) Major Research Project: Construction of microbial catalysts by recombinant DNA technology and their subsequent evaluation under fermentation conditions for the synthesis of 1,2,4-butanetriol from carbohydrates.

University of Waterloo, *Industrial Biotechnology Center*, Department of Chemical Engineering, Canada: **1999 - 2000**

Research Associate: Major Research Project: Carried out bioprocessing strategies for improving productivity of filamentous microbial fermentations. Developed a general protocol for the cultivation of filamentous fungi to achieve low viscosity fermentation broths either by pellet formation or immobilization to enhance bioreactor productivity, and established bioprocessing protocols for reducing protease production to minimize heterologous protein product degradation. Worked as member of the team that prepared, presented and was awarded $0.5million Strategic

Research Grant for the project by the Natural Sciences and Engineering Research Council (NSERC-Canada)

Nkulenu Industries Limited, Accra, Ghana: **1997 - 1998**

Consultant: *A 30-employee food processing company with product lines for soft drinks, citrus fruits and pineapple preserves, and canned cream of palm fruit and vegetables for both national and international markets.* Major Project: Carried out Process Research & Development and established, organized courses and supervised the implementation of a Statistical Quality Control Program in conformance with the HACCP regulations of the U.S. Food and Drug Administration (FDA).

University of Exeter, *Washington Singer Laboratories*, Department of Biological Sciences, United Kingdom: **1993 - 1996**

Research Fellow: Major Research: Development of a large-scale process for recombinant transketolase catalysed carbon-carbon bond synthesis. Developed a reliable direct assay of the enzyme transketolase and undertook the relevant kinetic studies to resolve the reaction mechanism using model substrates, and thus established the appropriate rate equation of the biotransformation for reactor design

Loughborough University of Technology, *Chemical Engineering Dept.*, England: **1992 - 1993**

Visiting Research Fellow: Major Research Topic: Chitin recovery by lactic acid bacterial fermentation of shellfish waste. An environmentally-friendly bioprocess was developed to recover the chitin by lactic acid bacterial fermentation using a packed-bed fermentor, and coupling it to a vessel containing broth for recirculation using a pump connected to the packed-bed. The study provided initial data for improvement and optimization of the bioprocess

Norwegian University of Science & Technology, *Department of Biotechnology*, Trondheim, Norway: **1988 - 1991**

NTNF Postdoctoral Research Fellow & SINTEF Biotechnologist: Major Research Projects: Basic research in microbial biochemistry relating to osmoregulation in a marine microbe, and factors affecting itaconic acid fermentation by *Aspergillus terreus* in submerged culture. The study quantified the phenomenon and provided a biochemical explanation of the sensitivity of the fungus to lack of oxygen. In addition, the study resulted in the development of a simple and efficient method of producing highly productive mycelial pellets of *A. terreus* giving near

theoretical yields of the acid and low viscosity broths with improved oxygen mass transfer. The study on the basic biochemistry and physiology of osmoregulation in the marine bacterium provided biochemical data relating to the survival mechanism of a marine anerobic fish spoilage bacterium prevalent in the Norwegian fish breeding industry. Glycine betaine was identified to be accumulated by the bacterium at high medium osmolarity (similar to conditions in the gut of fish where it is isolated) to relieve hypertonic osmotic stress.

Council for Scientific & Industrial Research's *Industrial Research Institute,* Accra & University of Ghana, *Department of Chemistry,* Legon-Accra: **1984 - 1988**

Research Officer: Major Project: Fermentation ethanol production

Lecturer: Developed and taught undergraduate courses in Industrial Chemistry, and Fermentation Technology.

PUBLICATIONS:

McIver AM, Janardhan Garikipati SVB, Bankole KS, Gyamerah M, Peeples TL (2008) Microbial oxidation of naphthalene to *cis*-1,2 naphthalene dihydrodiol using naphthalene dioxygenase in biphasic media. *Biotechnol Prog* 24: 593 - 598

Gyamerah M, Merichetti G, Adedayo O, Scharer JM, Moo-Young M (2002) Bioprocessing strategies for improving hen-egg white lysozyme (HEWL) production by recombinant *Aspergillus niger* HEWL WT-13-16. ***Appl Microbiol Biotechnol*** 60 (4): 403-407

Gyamerah M and Willetts AJ (1997) Kinetics of overexpressed transketolase from *Escherichia coli* JM 107/pQR 700. ***Enzyme Microb Technol*** 20: 127-134.

Gyamerah M and Glover J (1996) Production of ethanol by continuous fermentation and liquid-liquid extraction. ***J Chem Tech Biotechnol*** 66(2): 145-152.

Lilly MD, Chauhan R, French C, Gyamerah M, Hobbs GR, Humphrey A, Isupov M, Littlechild JA, Mitra RK, Morris KG, Rupprecht M, Turner NJ, Ward JM, Willetts AJ, Woodley JM (1996) Carbon-carbon bond synthesis: The impact of rDNA technology on the production and use of *Escherichia coli* transketolase. ***Ann NY Acad Sci*** 782: 513-525.

Gyamerah M (1995) Factors affecting the growth form of *Aspergillus terreus* NRRL 1960 in relation to itaconic acid fermentation. ***Appl Microbiol Biotechnol*** 44 (3-4): 356-361.

Gyamerah M (1995) Oxygen requirement and energy relations of itaconic acid fermentation by *Aspergillus terreus* NRRL 1960. ***Appl Microbiol Biotechnol*** 44 (1-2): 20-26

Hobbs GR, French C, Gyamerah M, Morris G, Lilly MD, Turner NJ, Ward JM, Willetts AJ, Woodley JM (1994) Development of a process for transketolase catalyzed carbon-carbon bond formation. In: ***Proc 1994 IChemE Research Event***, IChemE, Rugby, United Kingdom, pp 247-249.

CONFERENCES & SCIENTIFIC MEETINGS:

Gyamerah M (2008) Synthetic Biology: Potential and Implications of an Emerging Field. Paper presented at the 35th Annual Conference of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers, March 16 – 22, Philadelphia, PA, USA.

Atkinson A, Derritt C, Adelekan A, Gyamerah M (2007) Bioconversion of naphthalene by recombinant *Escherichia coli* in biphasic media. Poster presented at the 34th Annual Conference of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers, April 1-7, Orlando, FL, USA.

Atkinson A, Bankole K, Gyamerah M, Caulfield L, Davis C, Garikipati SVBJ, Peeples TL, Olivo H, Subramaniam B (2006) Solvent tolerant enzyme and microbial systems for aryl oxidations. Poster presented at 33rd Annual Conference of the National Organization for the

Professional Advancement of Black Chemists and Chemical Engineers, April 9-15, Los Angeles, CA, USA.

Bankole KS, Gyamerah M (2005) Solvent tolerant enzyme and microbial systems for biocatalytic processes. . Paper presented the 2005 AIChE Annual Meeting (Catalysis and Reaction Engineering Division: Catalysis for Pharmaceuticals and Fine Chemicals I Session, Cincinnati Convention Center) October 30 – November 4, Cincinnati, OH., USA.

Osborne-Lee IW, Gyamerah M (2005) Challenges in Teaching Capstone Design. Paper presented the 2005 AIChE Annual Meeting (Education: Free Forum on Engineering Education II Session, Colonade A, Millennium Hotel) October 30 – November 4, Cincinnati, OH., USA.

Gyamerah M, Osborne-Lee IW (2005) Introduction to Biotechnology – a Course for the Chemical Engineering Curriculum. Paper presented the 2005 AIChE Annual Meeting (Education: What a ChE Educator Needs to Know about Bio, Pavilion A, Millennium Hotel) October 30 – November 4, Cincinnati, OH., USA.

Peters M, Farquharson O, Ademolu O A, Gyamerah M (2005) Citric acid and itaconic acid production in solid state and submerged fermentation systems. Paper presented at 32nd Annual Conference of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (Chemical Engineering Technical Session), March 20 -26, JW Marriot, Grande Lakes, Orlando, FL., USA.

Ademolu OA, Deason JD, Gyamerah M (2004) Production of organic acids in solid state fermentation systems. Paper presented at 31st Annual Conference of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (Biochemistry & Biotechnology Technical Session), April 11 – 17, Marriot & Marina, San Diego, California, USA.

Gyamerah M (2003) On the mechanisms of organic acids fermentation by *Aspergillus terreus* and *Aspergillus niger*. Paper presented at 30th Annual Conference of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (Biochemistry & Biotechnology Technical Session), April 13 – 18, Indianapolis Marriot, Indiana, USA.

Gowthaman MK, Gyamerah M, Moo-Young M (1999) Fungal enzyme production in solid state fermentation systems. Poster presented at the third conference on ***Recent Advances in Fermentation Technology (RAFTIII)***, sponsored by the Society for Industrial Microbiology (SIM) and the Division of Biochemical Technology (BIOT) of the American Chemical Society (ACS) at Hyatt Saratosa, Saratosa, Florida, USA, November 13-16.

Gyamerah M, Mitra RK, Willetts AJ (1995) Kinetics of overexpressed transketolase from *Escherichia coli* JM 107/pQR 700. Poster presented at ***Biotrans'95***, September 5-8, organized by the Royal Society of Chemistry (UK), at University of Warwick, Coventry, United Kingdom.

Gyamerah M, Jenssen EB, Larsen H (1991) On the mechanism of itaconic acid fermentation by *Aspergillus terreus*. ***Abstract of Communication***, 27 Annual Meeting of the Norwegian Biochemical Society, January 17-20, Storefjell hoyfjellshotell, Norway.

Gyamerah M and Larsen H (1990) Oxygen requirement and energy relations of itaconic acid fermentation by *Aspergillus terreus*. ***Abstract of Communication***, *Symposium on Physiological Aspects of Product Formation by Filamentous Fungi*, p36. European Federation of

Biotechnology, Working Party of Microbial Physiology, Gozd Martuljek, Yugoslavia, November 4-7.

Gyamerah M and Glover J (1983) Ethanol by continuous fermentation using a combination of immobilized yeast and solvent extraction. Paper presented at Conference on ***Advances in Fermentation'83***, at Chelsea College, University of London, September 21-23.

SCIENTIFIC & TECHNICAL REPORTS:

Gyamerah M (1993) Chitin production by lactic acid fermentation of shellfish waste. ***Research Report***, Department of Chemical Engineering, Loughborough University of Technology, UK.

Gyamerah M (1991) Intracellular pool constituents and their role in cell physiology in a marine psychrophilic obligate anaerobic *Bacteroidaceae* B.6. ***Research Report***, Department of Biotechnology, Norwegian University of Science & Technology, Trondheim, Norway.

Gyamerah M and Ochran RA (1988) Report of study on rapid determination of ethanol in a distilled alcoholic beverage by chemical oxidation. ***Technical Report***, Industrial Research Institute, Accra, Ghana.

Gyamerah M and Tusah J (1987) A contribution to optimization of the production of a distilled alcoholic beverage. ***Technical Report***, Industrial Research Institute, Accra, Ghana.

ASSOCIATIONS:

- Graduate Member, Institution of Chemical Engineers (United Kingdom), 1994 - 1999.
- Associate Member (AMIChemE), Institution of Chemical Engineers (United Kingdom), 1999 - Present.
- Member, Norwegian Biochemical Society, 1989 – Present
- Member, National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE), 2000 – Present
- Member, American Society for Engineering Education (ASEE), 2002 – Present
- Member, American Institute of Chemical Engineers (AIChE), 2005 – Present