

## DANIEL K. AFOSAH

Department of Chemistry and Biochemistry, Washington and Lee University  
Science Addition A429, Lexington, VA 24450  
dafosah@wlu.edu (540) 458-4850

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### EDUCATION AND TRAINING

<b>NIH K12 Postdoctoral Scholarship</b> (Oct 2018 – June 2021)	<b>Translational GlycOmicS Program for Career Development in Glycoscience</b> Institute for Structural Biology, Drug Discovery, and Development Virginia Commonwealth University, Richmond, VA, USA
<b>Postdoctoral Fellowship</b> (Aug 2017 – Oct 2018)	Institute for Structural Biology, Drug Discovery, and Development Virginia Commonwealth University, Richmond, VA, USA
<b>Doctor of Philosophy</b> (Aug 2012 – Aug 2017)	<b>Pharmaceutical Sciences – Medicinal Chemistry</b> Virginia Commonwealth University, Richmond, VA, USA
<b>Master of Science</b> (Aug 2008 – Jun 2010)	<b>Pharmaceutical Analysis and Quality Control</b> Kwame Nkrumah University of Science and Technology, Kumasi, Ghana
<b>Bachelor of Pharmacy</b> (Aug 2003 – Jun 2007)	Kwame Nkrumah University of Science and Technology, Kumasi, Ghana First class honors, Deans List (2003 – 2007) <b>Registered pharmacist in Ghana since May 2009</b>

### TEACHING EXPERIENCE

July 2021 – Present	<b>Assistant Professor of Chemistry</b> , Washington and Lee University, Lexington, VA <ul style="list-style-type: none"><li>• Chem 341: Biochemistry I</li><li>• Chem 110: General Chemistry</li></ul>
Aug 2017 – May 2018	<b>Adjunct Faculty</b> , University of Richmond, Richmond, VA <ul style="list-style-type: none"><li>• Prepared and delivered pre-lab lecture materials for Chem 206 (Organic Chemistry II).</li><li>• Instructed and supervised undergraduate students in laboratory sessions.</li><li>• Prepared, administered, and graded quizzes, lab reports, and examinations.</li></ul>
Aug 2012 – Jul 2015	<b>Teaching Assistant</b> , School of Pharmacy, Virginia Commonwealth University, Richmond, VA <ul style="list-style-type: none"><li>• Tutored and graded PharmD students in the underlisted courses<ul style="list-style-type: none"><li>○ Foundations I, II and III courses (PHAR 523, PHAR 524, PHAR534).</li><li>○ Pharmaceutical Principles for the Practicing Pharmacist course (MEDC527).</li><li>○ Pharmacy Informatics (PHAR 567).</li></ul></li><li>• Tutored PharmD students in biochemistry, and organic and medicinal chemistry.</li><li>• Tutored PharmD and graduate students, and guided five (5) students with their research projects in the Advanced Molecular Modeling Theory and Practice course (MEDC670).</li></ul>
Aug 2007 – May 2010	<b>Teaching Assistant</b> , School of Pharmacy, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana <ul style="list-style-type: none"><li>• Guided pharmacy students in pharmaceutical chemistry laboratory exercises.</li><li>• Tutored pharmacy students in biochemistry, medicinal, and analytical chemistry.</li><li>• Proctored and graded exams in biochemistry, medicinal, and analytical chemistry.</li></ul>

## **PROFESSIONAL AND RESEARCH EXPERIENCE**

- Oct 2018 – Jun 2021 **NIH K12 Postdoctoral Scholar**, Translational GlycOmics Program for Career Development in Glycoscience, Institute for Structural Biology, Drug Discovery, and Development, Virginia Commonwealth University, Richmond, VA
- Studied the interactions of glycosaminoglycans with proteins.
  - Designed and developed fluorescent probes for the study of protein-ligand interactions.
  - Mentored and trained one graduate and four undergraduate students.
- Aug 2017 – Oct 2018 **Postdoctoral Research Fellow**, Institute for Structural Biology, Drug Discovery, and Development, Virginia Commonwealth University, Richmond, VA
- Design, synthesis, and biochemical studies of glycosaminoglycans (GAGs) and GAG mimetics.
  - Mentored one graduate student
- Aug 2012 – Jun 2017 **Research Assistant**, School of Pharmacy, Virginia Commonwealth University, Richmond, VA
- Designed and synthesized over 50 sulfated glycosaminoglycan mimetics targeting thrombin and plasmin using multi-step synthesis employing orthogonal functional group protection and deprotection, cyclization, nucleophilic substitution, halogenation, coupling, and sulfation reactions.
  - Conducted biochemical studies to determine potency and mechanisms of inhibition.
  - Studied the interactions of glycosaminoglycans with proteins including human neutrophil elastase, glycoprotein D, and p300 histone acetyltransferase.
  - Mentored one undergraduate and three graduate students.
- Aug 2011 – Jul 2012 **Regulatory Officer**, Ghana Food & Drugs Authority, Accra, Ghana
- Developed and validated methods for drug products, and analyzed drug products
  - Reviewed applications of drug products for registration.
  - Planned and conducted pharmacovigilance activities to assess the safety of medicines.
- Apr 2011 – Jul 2011 **Quality Control Pharmacist**, Ernest Chemist Ltd., Tema, Ghana
- Developed and validated HPLC methods for the analysis of over-the-counter analgesics.
  - Conducted routine analysis of pharmaceutical products to ensure quality.
  - Trained four production staff on Good Manufacturing Practice (GMP) guidelines.
  - Conducted quality audits of the production and packaging activities of the company.
- Dec 2010 – Mar 2011 **Retail Pharmacist**, Unicom Chemists Ltd., Accra, Ghana
- Supervised two pharmacy assistants and a pharmacy technician.
  - Monitored prescriptions and counseled patients to ensure the safe use of medicines.
- Jan 2010 – Dec 2010 **Superintendent Pharmacist**, Pokupharma Ltd., Kumasi, Ghana
- Monitored the procurement, safe storage, and distribution of medicines and trained sales representatives.

## **PUBLISHED PAPERS**

1. Boothello, R. S.; Sankaranarayanan, N.V.; **Afosah, D. K.**; Karuturi, R.; Al-Horani, R. A.; and Desai, U. R. Studies on Fragment-Based Design of Allosteric Inhibitors of Human Factor Xia. *Bioorg. Med. Chem.* **2020**, *28*, 1101 – 1105. (PMID: 29459207)
2. **Afosah, D. K.**; Al-Horani, R. A. Sulfated Non-Saccharide Glycosaminoglycan Mimetics as Novel Drug Discovery Platform for Various Pathologies. *Curr. Med. Chem.* **2020**, *27*, 3412 – 3447. (PMID: 30457046)
3. Al-Horani, R. A.; Abdelfadiel, E. I.; **Afosah D. K.**; Morla, S.; Sistla, J. C.; Mohammed, B.; Martin, E. J.; Sakagami, M.; Brophy, D. F.; Desai, U. R. *J. Thromb Haemost.* **2019**, *17*, 2110 – 2122. (PMID: 31397071)
4. Morla, S.; Sankaranarayanan, NV.; **Afosah, D. K.**; Kumar, M.; Kummarapurugu, A. B.; Voynow, J. A.; Desai, U. R. On the Process of Discovering Leads that Target the Heparin-Binding Site of Neutrophil Elastase in the Sputum of Cystic Fibrosis Patients. *J. Med. Chem.* **2019**, *62*, 5501 – 5511. (PMID: 31074986)

5. Patel, N. V.; Patel, D. V.; Kanhed, A. M.; Patel, S. P.; Patel, K. V.; **Afosah, D. K.**; Desai, U. R.; Karpoormath, R.; Yadav, M. R. 2-Aminobenzamide-Based Factor Xa Inhibitors with Novel Mono- and Bi-Aryls as S4 Binding Elements. *ChemistrySelect*. **2019**, *4*, 802 – 809.
6. Gangji, R.; Sankaranarayanan, NV.; Elste, J.; Al-Horani, R. A.; **Afosah, D. K.**; Joshi, R.; Tiwari, V.; Desai, U. R. Inhibition of Herpes Simplex Virus-1 Entry into Human Cells by Non-Saccharide Glycosaminoglycan Mimetics. *ACS Med. Chem. Lett.* **2018**, *9*, 797 – 802. (PMID: 30128070)
7. Kummarapurugu, A.; **Afosah, D. K.**; Sankaranarayanan, NV.; Gangji, R.; Zheng, S.; Kennedy, T.; Rubin B. K.; Desai, U. R.; Voynow, J. A. Molecular Principles for Heparin Oligosaccharide-Based Inhibition of Neutrophil Elastase in Cystic Fibrosis. *J. Biol. Chem.* **2018**, *293*, 12480 – 12490. (PMID: 29903912) (*Co-first authorship*)
8. Al-Horani, R. A.; **Afosah, D. K.** Recent Advances in the Discovery and Development of Factor XI/XIa Inhibitors. *Med. Res. Rev.* **2018**, DOI: 10.1002/med.21503. (PMID: 29727017)
9. **Afosah, D. K.**; Verespy, S; Al-Horani R. A.; Boothello, R. S.; Karuturi, R.; Desai, U. R. A Small Group of Sulfated Benzofurans Induce Steady-State Submaximal Inhibition of Thrombin. *Bioorg. Med. Chem. Lett.* **2018**, *28*, 1101–1105. (PMID: 29459207)
10. **Afosah, D. K.**; Al-Horani, R. A.; Sankaranarayanan, NV.; Desai, U, R. Potent, Selective, Allosteric Inhibition of Human Plasmin by Sulfated Non-Saccharide Glycosaminoglycan Mimetics. *J. Med. Chem.* **2017**, *60*, 641–657. (PMID: 27976897)
11. Zheng, S.; Kummarapurugu, A.; **Afosah, D. K.**; Sankaranarayanan, NV.; Boothello, R. S.; Desai, U. R.; Kennedy, T.; Voynow, J. A. 2-O, 3-O Desulfated Heparin Blocks High Mobility Group Box 1 Release by Inhibition of p300 Acetyltransferase Activity. *Am. J. Respir. Cell Mol. Biol.* **2017**, *56*, 90 – 98. (PMID: 27585400)
12. Al-Horani, R. A.; Karuturi, R.; Lee, M.; **Afosah, D. K.**; Desai, U. R. Allosteric Inhibition of Factor XIIIa. Non-Saccharide Glycosaminoglycan Mimetics, but Not Glycosaminoglycans, Exhibit Promising Inhibition Profile. *PLoS One* **2016**, *11*: e0160189. (PMID: 27467511)
13. Verespy, S.; Mehta, A. Y.; **Afosah, D.**; Al-Horani, R. A.; Desai, U. R. Allosteric Partial Inhibition of Monomeric Proteases. Sulfated Coumarins Induce Regulation, Not Just Inhibition, of Thrombin. *Sci. Rep.* **2016**, *6*, 24043. (PMID: 27053426)

## **BOOK CHAPTER**

1. **Afosah D. K.**; Morla S.; Campbell, C.; Desai U. R. Natural products for Cardiovascular Diseases Treatment. In *Pharmacognosy – Current Herbal Medicine and Natural Product Chemistry for PharmD Curriculum*, 1<sup>st</sup> Ed.; Zhang Y. Ed.; Cognella: San Diego, 2021; pp 161–210 (*Co-corresponding author*)

## **ORAL PRESENTATIONS**

1. Heparin: Beyond its Use as an Anticoagulant – *University of Ghana School of Pharmacy Seminar Series, Accra, Ghana (Nov 2019)*
2. Specificity of Glycosaminoglycan Interactions with Proteins. – *2<sup>nd</sup> Annual Great Lakes Translational Glycomics Symposium, Milwaukee, WI (May 2019)*
3. Glycosaminoglycans and Glycosaminoglycan Mimetics as Human Neutrophil Elastase Inhibitors for Cystic Fibrosis Management. – *ASBMB Annual Meeting/Experimental Biology 2019, Orlando, FL (April 2019)*
4. Identification of Defined Glycosaminoglycan Sequences for Human Neutrophil Elastase Inhibition. - *NIH Programs of Excellence in Glycosciences, Inter PEG 2018, San Diego, CA (March 2018)*
5. Improving the Side Effect Profile of Anticoagulants Using Thrombin Allosterism. – *Virginia Academy of Science Annual Meeting, Fredericksburg, VA (May 2016)*
6. Interaction of 2-O,3-O-Desulfated Heparin with p300 Histone Acetyltransferase. – *NIH Programs of Excellence in Glycosciences, Inter PEG 2016, Bethesda, MD (April 2016)*
7. Computational Design of Direct Allosteric Thrombin Inhibitors. – *Virginia Academy of Science Annual Meeting, Harrisonburg, VA (May 2015)*

## SELECTED POSTER PRESENTATIONS

1. **Afosah, D. K.;** Ongolu, R. K.; Nelson, K. T.; Desai, UR. A Strategy Based on Photo-affinity Probe and Proteomics to identify the Interactome of Non-Saccharide Glycosaminoglycan Mimetics – *Society for Glycobiology Annual Meeting*, Virtual (Nov 2020)
2. **Afosah, D. K.;** Sankaranarayanan, N. V.; Desai, U. R. Many Apparently Non-Selective GAG – Protein Systems May Exhibit Interesting Selectivity Features: The Case of Human Neutrophil Elastase. – *Society for Glycobiology Annual Meeting*, Phoenix, AZ (Oct 2019)
3. **Afosah, D. K.;** Sankaranarayanan, NV.; Morla, S.; Kumar, M.; Ganji R. N.; Kummarapurugu, A.; Zheng, S.; Voynow, J. A.; Desai, U. R. Glycosaminoglycans and Glycosaminoglycan Mimetics as Human Neutrophil Elastase Inhibitors for Cystic Fibrosis Management. – *ASBMB Annual Meeting/Experimental Biology 2019*, Orlando, FL (April 2019)
4. **Afosah, D. K.;** Sankaranarayanan, NV.; Morla, S.; Kumar, M.; Ganji R. N.; Kummarapurugu, A.; Zheng, S.; Voynow, J. A.; Desai, U. R. Inhibition of Human Neutrophil Elastase by Glycosaminoglycans (GAGs) And Non-Saccharide GAG Mimetics. *Medicinal Chemistry Gordon Research Conference*, New London, NH (August 2018)
5. **Afosah, D. K.;** Kummarapurugu, A.; Sankaranarayanan, NV.; Zheng, S.; Kennedy, T.; Rubin B. K.; Voynow, J. A.; Desai, U. R. Non-Anticoagulant Glycosaminoglycans as Anti-Neutrophil Elastase Agents in the Management of Cystic Fibrosis. – *Virginia Drug Discovery Rx*, Arlington, VA (June 2018)
6. **Afosah, D. K.;** Sankaranarayanan, NV.; Kumar, M.; Kummarapurugu, A.; Zheng, S.; Voynow, J. A.; Desai, U. R. Identification of Defined Glycosaminoglycan Sequences for Human Neutrophil Elastase Inhibition. – *NIH Programs of Excellence in Glycosciences, Inter PEG 2018*, San Diego, CA (March 2018)
7. **Afosah, D. K.;** Sankaranarayanan, NV.; Kumar, M.; Kummarapurugu, A.; Zheng, S.; Voynow, J. A.; Desai, U. R. The interaction of neutrophil elastase with Heparin. Sorting elements of Specificity. – *NIH Programs of Excellence in Glycosciences, Inter PEG 2017*, Bethesda, MD (April 2017)
8. **Afosah, D. K.;** Al-Horani, R. A.; Sankaranarayanan, NV.; Umesh R. Desai. Sulfated Diflavonoids are Potent, Selective, and Allosteric Inhibitors of Human Plasmin. – *68<sup>th</sup> Southeastern Regional Meeting of the ACS*, Columbia, SC (October 2016)
9. **Afosah, D. K.;** Verespy, S.; Boothello, R.; Karuturi R.; Desai, U. R. Reducing Bleeding Risks of Anticoagulants Through a Novel Partial Inhibition Approach. – *252<sup>nd</sup> American Chemical Society National Meeting and Exposition*, Philadelphia, PA (August 2016).
10. **Afosah, D.;** Sankaranarayanan, NV.; Zheng, S.; Kummarapurugu, A.; Boothello, R. S.; Voynow, J. A.; Desai, U. R. Interaction of 2-O,3-O-Desulfated Heparin With p300 Histone Acetyltransferase. – *NIH Programs of Excellence in Glycosciences, Inter PEG 2016*, Bethesda, MD (April 2016)

## SERVICE

- Sep 2019 – Apr 2020      **Co-chair**, Great Lakes Translational Glycomics Symposium, Milwaukee, WI
- Selected and invited speakers and potential sponsors for the symposium.
- Jan 2019 – Present      **Organizer and Mentor**, Saturdays with Scientists at Henrico Middle Schools, Henrico, VA. (L. Douglas Wilder and Rolfe Middle Schools)
- Program aimed at encouraging minority participation in the sciences.
  - Championed the establishment of the program.
  - Recruit volunteers, design experiments and prepare materials, mentor and guide middle school students.
- Jan 2017 – Feb 2019      **Mentor**, Higher Achievement, Richmond, VA
- Mentored and tutored middle school students in mathematics.
- Jan 2017 – Apr 2017      **Future GlycoGen Leader**, Inter-PEG Annual Meeting, Bethesda, MD
- One of the six leaders for young researchers in the NIH Programs of Excellence in Glycosciences.
  - Planned the 2017 Inter-PEG Meeting in Bethesda, MD.
- Jan 2017 – Feb 2019      **Judge**, Virginia Junior Academy of Science (VJAS), VA
- Judge for VJAS middle and high school competitions since 2016.

- Jan 2016 – Jan 2017     **President**, Association of African Graduate Students at VCU
- Championed the formation of the organization.
  - First president of the association.
- Aug 2015 – Jul 2016     **Vice Chair**, Medical Sciences Division, Virginia Academy of Science
- Planned activities of the division.
  - Chaired sessions at the 2016 VAS Annual Meeting.
- Jan 2015 – May 2016     **President**, Medicinal Chemistry Graduate Students Assoc. at VCU (VCU MEDI GSA)
- Represented the student body at Graduate Advisory Board meetings
  - Gave a presentation on the VCU MEDI GSA at the ACS MEDI Executive Committee Meeting at the 252<sup>nd</sup> ACS National Meeting and Exposition in Philadelphia, PA.
  - VCU MEDI GSA was adopted as a model student association during my term.
- Jan 2014 – Dec 2014     **Vice President**, VCU MEDI GSA
- Instituted a student-led workshop series to train students and postdoctoral fellows on research techniques.

### **REVIEWING ACTIVITY**

- **International Journal of Molecular Sciences** (Multidisciplinary Digital Publishing Institute)
- **Scientific Reports** (Nature Publishing Group)

### **HONORS AND AWARDS**

- Nov 2020     Best Poster Award, Society for Glycobiology Annual Meeting
- Sep 2019     Society for Glycobiology Travel Award
- Apr 2019     ASBMB IMAGE Grant-Writing Workshop Award
- Jan 2019     ASBMB Postdoctoral Researcher Travel Award
- Oct 2018     NIH K12 Scholarship, Translational GlycOmics Program for Career Development in Glycoscience (3-year award for research training in Glycosciences)
- Jul 2018     Carl Storm Underrepresented Minority Fellowship (Award to attend and present a poster at the 2018 Medicinal Chemistry Gordon Research Conference).
- May 2017     VCU School of Pharmacy Rector and Rorrer Award for Graduate Studies (Award for demonstrating excellence in research, scholarship, teaching, and service).
- May 2017     VCU School of Pharmacy Blake Putney Award (Award in recognition of outstanding scholarship).
- Apr 2017     VCU School of Pharmacy J. Doyle Smith Award (Award for most outstanding Medicinal Chemistry student in the areas of research, teaching, and service).
- May 2016     VCU School of Pharmacy Graduate Travel Award
- Apr 2016     VCU Phi Kappa Phi School of Pharmacy Scholarship Award
- Feb 2016     Outstanding Poster Presentation, VCU ISBDDD 3D Summit
- Apr 2014     VCU Phi Kappa Phi School of Pharmacy Scholarship Award
- Aug 2013     VCU Department of Medicinal Chemistry Best Seminar Award

### **PROFESSIONAL & HONOR SOCIETY MEMBERSHIPS**

- 2019 – Present     Society for Glycobiology
- 2018 – Present     American Society for Biochemistry and Molecular Biology
- 2015 – Present     Virginia Academy of Science
- 2015 – Present     Rho Chi Honor Society
- 2014 – Present     American Chemical Society
- 2013 – Present     Phi Kappa Phi Honor Society
- 2013 – Present     Alpha Epsilon Lambda Honor Society
- 2009 – Present     Pharmaceutical Society of Ghana