Jung Yeon Lee

RESEARCH INTERESTS

My current research centers around the synthesis of DNA/RNA nanostructures and the studies of their dynamic features in various biochemical environments.

EDUCATION

Ph.D. Chemistry 2019-Current
Rutgers University at Newark (RUN)
Supervised by Dr. Fei Zhang

M.A., Chemistry 2017 - 2018
University of Maryland at Baltimore County (UMBC)
Supervised by Dr. Mark Allen

B.S., Pharmaceutical Sciences 2011 - 2016
The State University of New York at Buffalo (UB)

Non-Degree, Biochemistry 2009 - 2011
Georgia Institute of Technology (GT)

PUBLICATIONS

1. Lee, Jungyeon, Qi Yang, Xu Chang, Henry Wisniewski, Tiffany Olivera, Minu Saji, Suchan Kim, Devanathan Perumal, and Fei Zhang. "Nucleic acid paranemic structures: a promising building block for functional nanomaterials in biomedical and bionanotechnological applications." *Journal of Materials Chemistry B* (2022).
2. Yang, Qi, Xu Chang, Jung Yeon Lee, Tiffany R. Olivera, Minu Saji, Henry Wisniewski, Suchan Kim, and Fei Zhang. "Recent advances in self-assembled DNA nanostructures for bioimaging." *ACS Applied Bio Materials* 5, no. 10 (2022): 4652-4667.
3. Chang, Xu, Qi Yang, Jungyeon Lee, and Fei Zhang. "Self-assembled Nucleic Acid Nanostructures for Biomedical Applications." *Current Topics in Medicinal Chemistry* 22, no. 8 (2022): 652-667.
4. Fu, Xiaoyi, Fangqi Peng, Jungyeon Lee, Qi Yang, Fei Zhang, Mengyi Xiong, Gezhi Kong, Hong-min Meng, Guoliang Ke, and Xiao-Bing Zhang. "Aptamer-functionalized DNA nanostructures for biological applications." *Topics in current chemistry* 378 (2020): 1-43.

RESEARCH EXPERIENCE

Research Assistant/Graduate Student at RUN 2019-Current
Dr. Fei Zhang's Lab, Department of Chemistry

- ❑ Project Title: Applying DNA Origami & Tile Assembly Techniques to Develop Unique Nucleotide-based Nanostructures and Elucidating the Mechanisms Underlying Their Dynamic Features
- ❑ Simulated/designed new structures using softwares such as Tiamat, Cadnano, etc.

❑ Created chemical buffers for synthesizing target nucleotide structures.

❑ Used characterization techniques such as AFM imaging and gel imaging

Research Assistant at UMBC 2018-Current

Dr. Mark Allen's Lab, Department of Chemistry

❑ Project Title: Identifying Peptide Sequences with High Adhesiveness for Sand Particles Using Phage Display Technique

❑ Designed phage display technique procedure with a M13-phage library that targets sand particles

❑ Characterized the binding strength of selected peptide sequences on sand particles using Input/Output study and TEM imaging

Research Assistant at UMBC 2017-2018

Dr. Songon An's Lab, Department of Chemistry

❑ Project title: The Ligation of DNA of Interest into a Commonly Used Cloning Vector such as pET Vectors; The Immunoprecipitation of Protein of Interest to Study the Protein's Function in Metabolism

❑ Conducted lab experiments involving cell culture techniques (e.g. passaging, storaging, wake-up, and cell count), gene cloning techniques (e.g. double digestion of both vector plasmid and DNA insert, ligation of the two, transformation of cells with new vectors made, culturing cells, miniprep of the plasmid vectors, and PCR), and DNA point mutations using a QuickChange Mutagenesis method

❑ Performed immunoprecipitation technique to extract protein of interest from cells, followed by SDS-PAGE analysis of the collected IP samples.

Research Assistant at UMBC 2017

Dr. Elsa Garcin's Lab, Department of Chemistry

❑ Project title: The Purification of GAPDH mutants

❑ Conducted lab experiments involving protein purification column chromatography using anion exchange column chromatography, SDS-PAGE gel analysis, and Affi-gel-Blue separation technique to elute fractions of interest (gradient vs. isocratic elution)

❑ Learned about how size exclusion chromatography is done

Undergraduate Researcher at UB 2016

Dr. Robert M. Straubinger's Lab, School of Pharmacy and Pharmaceutical Sciences

❑ Project title: The Study of Efficacy of Anti-pancreatic Cancer Drugs (paclitaxel and birinapant)

❑ Learned about how IC50 testing of paclitaxel and birinapant was done and how to perform cell culture techniques (e.g. passaging), a SRB assay, a serial dilution, and cell count

Undergraduate Researcher at UB 2014-2016

Dr. Ying Xu's Lab, School of Pharmacy and Pharmaceutical Sciences

❑ Project title: The Study of the Correlation between cAMP and gp91 Phox Subunit of

NADPHase

❑ Practiced lab skills such as Western Blotting, cell culture, cAMP testing to test the efficacy of a psychiatric drug

❑ Reviewed research and presented about how cAMP, cGMP, and gp91 phox subunit of NADPHase are correlated and how the techniques of siRNA infection work to knock down certain genes

Undergraduate Researcher at UB 2012
Dr. George Nancollas' Lab, Department of Chemistry

❑ Project title: The Atomic Force Microscopy (AFM) Studies of Crystal Growth

❑ Reviewed and presented studies on the use of AFM in investigating the effect of variables such as temperature, solution impurities, and diffraction properties on crystal growth

Molecular Imaging for Drug Discovery Course (CHEM 684) at UMBC 2017

❑ Learned how to perform cell culturing (Hs578T Human Breast Carcinoma Cells), transfection, cell fixation, and fluorescence imaging

❑ Used imageJ software to analyze images taken from a fluorescence-imaging microscope (confocal microscopy)

❑ Wrote a lab report on a project that studies the interaction of Actin and IMPDH2 in Hs578T cells by analyzing the localizations of these two targets in the cells (a test for co-localization)

Pharmaceutical Science Research Course (PHC 421 LAB/LEC) at UB 2015

❑ Investigated in vitro dissolution rate of different acetaminophen tablet dosage forms using 6 bell-shaped dissolution vessels also known as Paddle Apparatus

❑ Tested aspirin degradation kinetics to calculate shelf-life

❑ Performed experiments on drug compounds using High Performance Liquid Chromatography (HPLC), mass spectrometry, and UV spectrophotometer

❑ Tested solubility of a drug compound using complexation method

❑ Analyzed thermograms from differential scanning calorimetry (DSC)

❑ Carried out a drug fluorescence test using High Throughput Screening (HTS)

❑ Practiced writing complete laboratory reports including abstract, introduction, method, result, conclusion and discussion

TEACHING/ADMINISTRATIVE EXPERIENCE

Teaching Assistant 2019-Current
Department of Chemistry at Rutgers University at Newark (RUN)

❑ Taught General Chemistry and Analytical Chemistry Labs to undergraduate students.

❑ Created weekly quizzes and prepared lab materials (chemicals and device set-up) before every lab

❑ Became familiar with the Blackboard/Canvas online learning system (creating/grading quizzes/tests online, online teaching via Blackboard Collaborate Ultra, etc.)

❑ Guided students to perform experiments according to a given protocol
❑ Provided a short introductory lecture/demonstration in the beginning of each class for an overview
❑ Promoted active learning by engaging students into interactive discussions
❑ Graded exams and work assignments according to rubrics given

Teaching Assistant 2017-2018
Department of Chemistry at University of Maryland Baltimore County (UMBC)
❑ Taught General Chemistry, Analytical Chemistry, and Organic Chemistry Labs to undergraduate students
❑ Guided students to perform experiments according to a given protocol
❑ Provided a short introductory lecture in the beginning of each class for an overview
❑ Promoted active learning by engaging students into interactive discussions
❑ Graded exams and work assignments according to rubrics given

Science Teacher 2016-2017
YesClass, a Private Academy at Suwanee, Georgia, US
❑ Taught Biochemistry, Chemistry, and Biology to high school students
❑ Promoted active learning by engaging students into interactive discussions
❑ Utilized individual learning styles for effective teaching

OTHER WORK EXPERIENCE

Part-Time Research Assistant 2010
Department of Chemistry and Biochemistry at Georgia Institute of Technology
❑ Organized and distributed laboratory equipment in an efficient way such as creating different workstations with equipment needed for each work
❑ Cleaned used equipment appropriately after research
❑ Prepared solutions needed for undergraduate students' experiments

Pharmacist Assistant 2010
Georgia Institute of Technology Pharmacy at Atlanta, Georgia, US
❑ Classified and placed drugs in appropriate places
❑ Prepared final drug products with correct labels and appropriate packaging

OTHER SKILLS

Languages: Fluent in English and Korean; Elementary level of Spanish
Computers: Excellent skills for using Microsoft Office, PowerPoint, Statistical program such as Excel, Mac OS X, and Google Apps

PRESENTATIONS

Lee, Jungyeon, 2018. Finding a Silica-binding Peptide Sequence with Adhesiveness via Phage Display Technique. Literature Assessment Course (CHEM 720) at UMBC, Baltimore. December 19, 2018

Lee, Jungyeon, Huerta-Alvarado, Manuel, Moreau, Nashara, and Peterson, Tyler, 2018 Bio-Inspired Surfaces for Attachment. Presented at Bio and Bio-inspired materials (CHEM 684) course at UMBC, Baltimore. December 4, 2018

Lee, Jungyeon, 2018 STED and Lattice Light Sheet Microscopy Technologies for Imaging Mitochondria in Breast Cancer. Presented at Advanced Analytical Chemistry (CHEM 667) course at UMBC, Baltimore. November 20, 2018

Lee, Jungyeon, 2018 Targeting the Warburg Effect for Cancer Treatment: The Regulation of Pyruvate Kinase Muscle Type Isoform 2 (PKM2) by Biological Molecules and Drugs. Comprehensive Biochemistry 2 (CHEM 683) at UMBC, Baltimore. Spring 2018

Lee, Jungyeon, 2018 Inorganic Chemistry Approach to Capturing/Detecting Pollutants such as Carbon Dioxide and Metal Ions. Inorganic Chemistry (CHEM 605) at UMBC, Baltimore. Spring 2018

Lee, Jungyeon, 2018 Molecular Cloning of Recombinant DNA & QuickChange Mutagenesis Project. Presented at Dr. An's lab group meeting at UMBC, Baltimore. April 11, 2018

Lee, Jungyeon, 2018 Immunoprecipitation and Its Application. Presented at Dr. An's lab group meeting at UMBC, Baltimore. March 20, 2018

Lee, Jungyeon and Tran Anh, 2017 Purification of GAPDH Mutants (Done under Dr. Garcin's Lab). Presented at Lab Rotation Research Talk at UMBC, Baltimore. Fall 2017

Lee, Jungyeon, 2017 The Efficient Elimination of Solid Tumor Cells by using SNAP-Tag Technology. Presented at Molecular Imaging for Drug Discovery (CHEM 684) course at UMBC, Baltimore. December 5, 2017

Lee, Jungyeon, 2017 Exploring the Interactions Between Actin and IMPDH2 in Hs578T Human Breast Carcinoma Cells. Molecular Imaging for Drug Discovery (CHEM 684) course at UMBC, Baltimore. December, 2017

Lee, Jungyeon, Li, Zhi, and Dr. Ying Xu, 2016 A Study of the Correlation between cAMP and gp91 Phox Subunit. Presented at the Methods and Scientific Communication (PHC 432) Course Conference at University at Buffalo School of Pharmacy and Pharmaceutical Sciences, Buffalo. May 7, 2016

Lee, Jungyeon, Eke, Kemji, and Paek, Jiwon, 2015 Effects of Humidity and Temperature on Ebola Proliferation. Presented at the Introduction to Research (PHC 332) Course Conference at

University at Buffalo School of Pharmacy and Pharmaceutical Sciences, Buffalo. May 3, 2015

Lee, Jungyeon, 2012 AFM Studies of Crystal Growth. Presented at Physical Chemistry Topic Lecture Course (CHE512) at University at Buffalo Department of Chemistry, Buffalo. April 19, 2012

ACTIVITIES & LEADERSHIP EXPERIENCE

Chemistry Graduate Student Association (CGSA) at UMBC, Member, Fall 2017-Fall 2018

- ❑ Worked together to maintain a supportive nurturing environment for the department's graduate students.

Pharmaceutical Sciences Club at the SUNY buffalo, Member, Aug 2013-May 2016

- ❑ Collaborated to do well in academic works and gathered for fun activities.

Pre-pharmacy Club at the State University of New York at Buffalo, Member, Sep 2011-2012

- ❑ Shared with members information and experiences about pharmacy school preparation: written exams, work experience, extracurricular activity, getting advice from the adviser.

PROFESSIONAL AFFILIATIONS

The National Society of Leadership and Success, Sigma Alpha Pi, Member, Sept. 2012
The National Society of Collegiate Scholars (NSCS), Member, February 2011
American Association of Pharmaceutical Scientists (AAPS), Member, September 2014

HONORS AND AWARDS

- ❑ Rutgers University at Newark Teaching Assistant Award (2019-2020): provided to a Teaching Assistant in recognition of outstanding efforts as a Teaching Assistant in the Analytical Chemistry Laboratory at RUN
- ❑ UMBC Chemistry Graduate Assistantships: provided to UMBC graduate students as financial resources for pursuing their degrees; Summer 2017-Fall 2018
- ❑ David E. Guttman Award: presented to a member of the graduating class at UB School of Pharmacy and Pharmaceutical Sciences who has demonstrated a high degree of interest and achievement in the area of pharmaceutical analysis and physical pharmacy, in memory of Dr. David E. Guttman, former Professor of Pharmaceutics; Spring 2016
- ❑ Certificate of Recognition: commendation from the Dean with High Distinction by UB School of Pharmacy and Pharmaceutical Sciences; Aug. 2015
- ❑ Nomination for membership of the Honor Society at UB: For high academic accomplishment and leadership potential (Honor Society of Sigma Alpha Pi); Sept. 2012
- ❑ Nomination for membership of the Honor Society at GT: For high-achieving 1st and 2nd year students (The National Society of Collegiate Scholars); February 28, 2011
- ❑ Palmetto Fellows Scholarship: Nominated as a student with qualification for the scholarship in fall 2009 by the South Carolina Commission on Higher Education; June 11, 2009