Youlin Liu

Brown 4170, Purdue University, West Lafayette, Indiana, 47907 +1 765-409-6703 liu1935@purdue.edu yliu0593

Research Interests

Spectroscopic imaging: Instrumentation design, data interpretation

Machine learning modeling: Classification, regression model building

Education

Purdue University — **West Lafayette, Indiana**
PhD in Chemistry (expected) — 2016–present

University of Science and Technology of China (USTC) — **Hefei, China**
Bachelor of Science, Chemistry — 2012–2016

Research Experience

Simpson Lab of Nonlinear Optics — **Purdue University**
Graduate Researcher — 11/2016–present

Hyperspectral infrared imaging microscope design and digital image analysis

Building of a hyperspectral microscope: co-propagation with a visible light source to achieve higher resolution images with IR information

- Aligning optical elements for the microscope
- Electronic control of the beam-scanning set-up with Alazar digitization cards and Labview control
- Image analysis methods: watershed algorithm for segmentation, shallow neural network for spectral classification

Adversarial spectroscopy: computational methods for testing robustness of linear classification algorithms

- Modified and optimized the genetic algorithm, particle swarm algorithm for the adversarial purpose
- Wrote the traditional statistical probability calculation into function to aid classification analysis

Molecular level protein interaction modeling with experimental observables

- Building of an artificial neural network as a regression model to link DLVO theorectical physical parameters to observables accessible via FRAP (Using tensorflow Keras, model under development)

Synchrotron X-ray damage analysis with non-negative matrix factorization

- Performed X-ray diffraction experiments at Argonne National Laboratory
- Indexing the peaks with XDS, HKL2000

DNA-Enabled-Nano-Group, USTC — **Hefei, China**
Undergraduate Researcher — 05/2015–06/2016

Inorganic synthesis method optimization of gold dimers for SERS

- Optimization of reaction time, dosage, coating type
- Characterization methods: DLS, UV-Vis, gel electrophoresis, Raman spectroscopy

Mesoscale Chemical Systems, University of Twente — **Enschede, The Netherlands**
Research Intern — 06/2015–08/2015

Sonochemical effects analysis with microfluidic sonochemical reactor

- Designed and conducted experiments to analyze sonochemical effects with chemiluminescence.
- Design mechanical solutions for experimental reproducibility
- Statistical significance analysis for large amount of data
- Use SEM for surface analysis

Environmental Engineering Laboratory, USTC — **Hefei, China**
Undergraduate Researcher — 01/2014–04/2015

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SeCd Quantum dots detoxification analysis in C. elegans
- Toxicity analysis with SeCd forming to quantum dots within C. elegans
- Characterization methods: HPLC, fluorescence microscopy,
- Maintenance of C. elegans in the laboratory

Skills

Proficient: LaTeX, Matlab

Fluent: python, git, bash

Intermediate: Linux

Laboratorial: Standard inorganic&organic synthesis, optical path alignment, X-ray diffraction operation, X-ray structure solving

Tools: HPLC, FT-IR, Raman, LabView, XDS, HKL2000, CCP4, Vina, ImageJ

Awards

- Outstanding USTC student awards, 2^{nd} metalist in 2013, 3^{rd} in 2014&2015
- CSC (China Scholarship Council) Full Scholarship for summer intern in Europe 2015

Outreach

Volunteer: National Chemistry Week 2016-2019
Hostess: Hostess for Stanford-USTC-MIT evening open dialogue with USTC students 2013
Volunteer: International communication voluntary group in USTC 2013-2016

Teaching Experience

Teaching Assistant General chemistry teaching assistant, Purdue University 2017-2018
Course Coordinator General chemistry II course coordinator for interactive teaching 2018
Graduate TA Mentor Guidance and feedback to new graduate teaching assistants 2018-2019

Honors Societies

Phi Lambda Upsilon National Honorary Chemistry Society 2016-present
Iota Sigma Pi National Honor Society for Women in Chemistry 2016-present

Conferences

Pittcon Hyperspectral IR imaging 2019
Turkey Run Adversarial Spectroscopy 2019

Publications

Casey J. Smith, **Youlin Liu**, Garth J. Simpson. "Adversarial Spectroscopy". (submitted)

Verhaagen, Bram, **Youlin Liu**, Andrés Galdames Pérez, Elena Castro-Hernandez, and David Fernandez Rivas. "Scaled-up sonochemical microreactor with increased efficiency and reproducibility." ChemistrySelect 1, no. 2 (2016): 136-139.