

Postdoctoral Researcher openings at the University of Delaware - Center for Composite Materials

The University of Delaware Center for Composite Materials (UD-CCM) is an internationally recognized center of excellence for interdisciplinary research, education, and technology transfer providing world-class research to both industry and government sponsors.

The UHMWPE fibers, such as Dyneema[®], have hierarchical architecture and the load transfer mechanisms at different length scales are still not well understood. In the Army Research Laboratory sponsored 'Physics of Soldier Protection' program, we plan to design and manufacture high performance UHMWPE fibers and their composites with optimized structures across length scales. This program involves modeling at nano-micro-meso scale, manufacturing the UHMWPE fiber/composites and experimental characterization. Molecular dynamics (MD) simulations will be used to model the fiber and fiber-ceramic interphase at the nano-scale considering variability in the fibril morphologies (crystalline, amorphous, semi-crystalline). We are seeking postdoctoral researchers to assist us developing strain-rate and structure dependent constitutive model for thermoplastic polymers (PE and TPU) and to understand their interaction mechanism with ceramics (SiC and B₄C) for high velocity impact applications using MD simulations.

Major Responsibilities

- Molecular dynamics (MD) based computational modeling and analyses.
- Develop structure-property relationship at ambient as well as extreme conditions (high temperature and transverse pressure) and feedback to finite element modelers for multi-scaling.
- Develop structure-property relationship to guide manufacturing process.
- Present work including theory, approach, results, and conclusions at ARL review meetings; report findings via government publications (technical reports), peer-reviewed publications, and conference presentations.
- Perform miscellaneous job-related duties as assigned.

Qualifications

- Ph.D. in Polymer Science, Materials Science and Engineering, Mechanical Engineering, or relevant disciplines.
- Strong background in polymer physics.
- Experience in all-atom MD modeling using advanced tools preferably with LAMMPS using reactive (AIREBO and ReaxFF) and non-reactive force fields.
- Experience in coarse-grain modeling using advanced tools preferably with LAMMPS.

- Experience in coarse-grain force field development.
- Expert in parallel computing and utilizing advanced computer simulation and visualization tools (LAMMPS, Ovito, VMD etc.).
- Proficient in programming languages (Matlab, Python etc.) to develop script for data analysis.
- Sound knowledge in solid mechanics and impact mechanics.
- Experience in DFT calculation and Reax force field parametrization.
- Ability to write high quality journal papers by planning and conducting systematic analysis and summarizing and organizing simulations data.
- Demonstrates an understanding and consideration of the differing needs and concerns of individuals with varying identities, cultures, and backgrounds.
- Committed to fostering a workplace culture of belonging, where diversity is celebrated, and equity is a core value.

Notice of Non-Discrimination, Equal Opportunity, and Affirmative Action

The University of Delaware does not discriminate against any person on the basis of race, color, national origin, sex, gender identity or expression, sexual orientation, genetic information, marital status, disability, religion, age, veteran status or any other characteristic protected by applicable law in its employment, educational programs and activities, admissions policies, and scholarship and loan programs as required by Title IX of the Educational Amendments of 1972, the Americans with Disabilities Act of 1990, Section 504 of the Rehabilitation Act of 1973, Title VII of the Civil Rights Act of 1964, and other applicable statutes and University policies. The University of Delaware also prohibits unlawful harassment including sexual harassment and sexual violence.

To apply, please send a cover letter, full resume and three recommendations to: hamed@udel.edu