

Independent Study at SIEN lab
Investigating self-healing capabilities of biomimetic hydrogels

In nature, living organisms exploit chemical and physical interactions between the inorganic and organic components of biominerals to achieve superior and unique properties. At SIEN, we are interested in understanding the role of mineral inclusions in gel-like materials as a method to toughen tissues. In this project, we will explore the nucleation of microcracks and their self-healing within a biomimetic hydrogel using microparticles as the inorganic inclusion. The geometrical arrangement of the beads, as well as the chemical composition of polymer network and surface coating of the microparticles will be modulated with the goal to comprehend the relevant mechanisms underlying self-healing. This project is an excellent opportunity in gaining experience with working in a lab dedicated to surface science and nanotechnology research. A PhD student will directly supervise the student, although, student's ability to be self-directed and independent is crucial.

The student will be involved in:

- Preparing hydrogel/microparticle composites with different microstructures.
- Studying how surface treatment of the microparticles can modulate bonding with the hydrogel network
- Conducting tensile tests samples and analysis of high-speed imaging

Preferred background:

Preferable for students with experience in wet-lab chemistry. Grades will be taken into account.

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