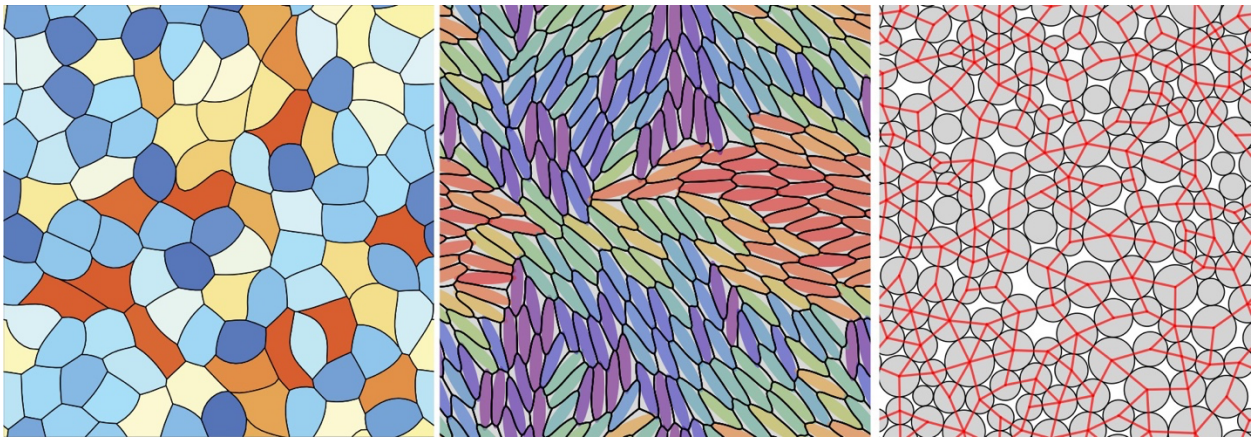
STI – PhD/Postdoc positions in Mechanics of Soft and Biological Matter Laboratory



In Mechanics of Soft and Biological Matter Laboratory (MESOBIO) at the Institute of Mechanical Engineering, EPFL, we are dedicated to acquiring fundamental insights on biological/living systems and soft/active materials. By employing principles in mechanics and physics, we strive to develop novel theoretical framework to understand emergent structures, dynamics, and mechanical properties within these systems. We are excited to invite talented, enthusiastic, and motivated students and postdocs to join our lab as founding members. We have two available positions at the moment: one postdoctoral fellow and one PhD student, or alternatively two positions for PhD students. The review of applications will continue until the positions are filled.

We endeavor to study problems broadly in the field of biomechanics, biophysics, and soft condensed matter physics. Our work encompasses a wide range of research questions, including but not limited to the following: embryonic development, tissue morphogenesis, structures and mechanics of soft materials, inherent structures of amorphous materials, and non-equilibrium dynamics of active matter. The following projects are currently open for incoming students and postdocs. The details of individual projects for students and postdocs will be jointly determined, taking into account the candidate's expertise and specific interests.

- Theoretical Modeling of Multicellular Systems: We develop a general theoretical framework, taking into account key features at cellular and subcellular scales to understand emergent properties at tissue scale. We investigate how multicellular systems actively regulate their cellular and subcellular properties to achieve desired structures. We also study how multicellular systems control phase transition behaviors that are essential during embryonic development and tissue morphogenesis.
- Theoretical Modeling of Soft Materials: We develop a simple but generic model of soft materials to understand how interactions between mesoscale structures determine macroscopic mechanical behaviors in these systems. We investigate correlations between structural features of mesoscale structure and emergent mechanical behaviors, which can be applied in the design of novel and programmable materials.
- Experimental Study of In-Vitro Cell Culture Systems: We use in-vitro cell culture systems to develop a fundamental understanding of tissue structure and collective dynamics. Combining high-resolution time-lapse imaging and advanced image analysis tools, we acquire quantitative data on tissue dynamics at the cellular scale. We apply principles of physics and mechanics to understand observed collective behaviors in the context of active materials.

We are looking to build a diverse and collaborative group and welcome applications from candidates with different backgrounds. Preferred skills and qualifications for successful candidates include: (1) Bachelor's and Master's Degree in Mechanical Engineering, Materials Engineering, Applied Mathematics, Physics, Applied Physics, or Biology for Ph.D students, and PhD degree in equivalent fields for postdoctoral fellows, (2) Demonstrated excellence and previous research experience in analytic modeling and numerical methods, (3) Strong background in Mathematics, Physics, and Mechanics, (4) Previous simulation experiences on discrete modeling are preferred, (5) Expertise in in-vitro cell culture experiments for experimental projects, (6) Excellent communication skills in English (both written and spoken), and (7) A self-driven individual with an open mind and a willingness to explore new fields

We offer highly competitive salary commensurate with previous experience, accompanied by comprehensive social benefits. All students and postdocs will have access to state-of-the-art computation and experimental facilities, enabling cutting-edge research opportunities and they will also have the opportunity to participate in collaborations within multidisciplinary projects

Interested candidates are requested to prepare their application as a single pdf file, including a cover letter (maximum 1 page), describing research interests and demonstrating how your background and previous experiences align with the direction of our group, and a comprehensive CV, providing detailed information about your academic and professional background and skills, accompanied by contact information of three references. The application should be direct submitted to Professor Sangwoo Kim (sangwoo.kim@epcl.ch) with the subject line, "Name: Application to PhD (or postdoc) Position". For additional information regarding the position, please feel free to reach out to Professor Sangwoo Kim.