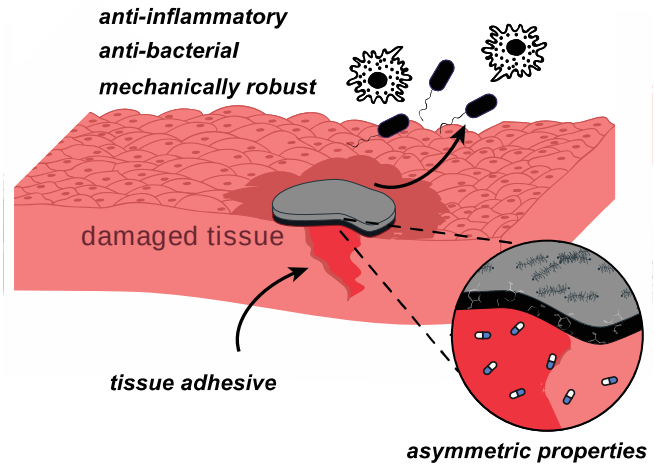
Master's Thesis project:

Working title: **"Tuning the lifetime & the mechanical properties of self-degradable wound healing patches"**

This topic is based on our recent publication: "*Multifunctional "Janus-Type" Bilayer Films Combine Broad-Range Tissue Adhesion with Guided Drug Release*", Kimna et al. 2022. (https://onlinelibrary.wiley.com/doi/full/10.1002/adfm.202105721).

In this publication, a multifunctional bilayer patch was introduced that combines distinct functions implemented into the two sides of the patch. This double-layer construct comprises:



- a bottom layer, which promotes tissue adhesion, can be loaded with drugs, and promotes wound healing
- a non-sticky top layer, which increases the mechanical stability of the film and has antimicrobial as well as anti-inflammatory properties

The aim of this Master's thesis project is to modify these biopolymer-based patches such that their lifetime and mechanical properties are tuned to match the requirements of different potential target scenarios, e.g., application onto eyes, into the oral cavity, or as sealant for surgery cuts or perforations of organs.

To achieve this,

1. individual components from either the top or the bottom layer of the film will be replaced with other macromolecules,
2. alternative techniques for generating the stabilizing layer will be tested, and
3. the mechanical properties of the films (tissue adhesion, resistance towards tearing, bending, and tribological loads) and their degradation dynamics in simulated body fluids will be assessed.

Ideally you studied Mechanical Engineering, Materials Science, Chemical Engineering, or a related program. Lab experience is required. If you are interested in this topic, please contact:

Maria Bauer, M.Sc.
maria.bauer@tum.de
Biopolymers and Bio-Interfaces Lab (Prof. Lieleg)