Optimization of protein separation by means of porous materials: a theoretical perspective

Abstract: The separation of polymers and or proteins is nowadays a matter of interest not only due to its scientific and technological application but also for the theoretical challenges that it provides. In between the diverse techniques to separate polymers, electrophoresis is one of the most established. According to this technique, polymers are driven by an electrostatic force across a porous material. Therefore, polymers with different length will travel at different speed due to their diverse effective interaction with the pores of the material. In this project we aim at studying such systems in a simplified manner, where the porosity of the material is captured by a varying-section channel. By means of numerical simulation we will compare the net speed of polymers against a simplified model that has already been tested for simpler geometries [1]. Finally, by tuning channel shape we aim at optimizing the separation capability of the channel.


Learning content:  
• Polymer physics  
• Brownian dynamics simulations  
• Non-equilibrium Thermodynamics

Supervisor: Dr. Paolo Malgaretti  
Max-Planck-Institut Int. Sys.  
Heisenbergstraße 3, 70563 Stuttgart  
Raum: 5E16  
Telefon: 0711-689-1914  
E-Mail: malgaretti@is.mpg.de  
URL: www.is.mpg.de/dietrich/malgaretti