PhD Program between Freie Universität Berlin (FUB) and the China Scholarship Council (CSC)

Open PhD Position at Freie Universität Berlin, offered only to Chinese CSC scholarship candidates 2026

Department/Institute: [**Biology/Chemistry/Pharmacy**]

Subject area: [**Protein Biochemistry/Structural Biology**]

Name of Supervisor: [**Prof. Dr. Christian Freund**]

Number of open PhD positions: [1]

Type of the PhD Study: [**Full-time**]

Project title: [**Mechanism and in vitro reconstitution of tapasin-mediated peptide exchange**]

The goal of this project is to rationalize the mode of action of MHC class I peptide exchange for distinct MHC class I allotypes and to establish a reduced *in vitro* system for MHC class I peptide presentation with predictive power. We will thereby address the following questions:

1.) What is the mechanistic and structural basis for tapasin interaction and editing with regard to different MHC-I allotypes ? Direct structural methods, in particular cryogenic electron microscopy, will be complemented by disulfide bond engineering and investigation of the dynamics of complex formation.

2.) Utilizing the MHC-I allotypes mechanistically investigated in goal 1 we will introduce point mutations based on the structures obtained. This allows us to probe the critical interfaces that enable antigen loading within the peptide loading complex. Further on, we will extend the approach to include probe the interaction of small molecules with the MHCI molecules during the process of peptide loading.

At the end of the PhD period we envisage that the two aims will synergize by providing a framework for understanding and better predicting the pathway of MHC-I antigens. Structural insights will have been gained that allow to delineate the peptide exchange process at the molecular level. Moreover, the interaction of small molecules with MHCI molecules have been probed and the insights can be used for interrogating the phenomenon of adverse drug reactivity.

Literature: Lan et al., Exchange catalysis by tapasin exploits conserved and allele-specific features of MHC-I molecules. Nat. Commun. 12, 4236 (2021).

Lan et al., J. Biol. Chem. (2023). doi: 10.1016/j.jbc.2023.102987

PhD Project description:

Language requirements:

- IELTS: 6,5 oder TOEFL: 95 ibt

Academic requirements:

Applications of highly motivated candidates with a master degree in the areas of structural, molecular or biochemistry are welcome. Experience in the areas of protein biochemistry or cellular immunology is desirable and qualifications and references should be excellent.

Information of the professor or research group leader (website, awards etc.):

Our group is interested in the understanding and manipulation of molecular interactions that govern the assembly of protein complexes. The focus is on proteins important for immune cell function, such as MHC class II molecule, integrin regulating scaffolds or alternatively spliced proteins. By using molecular and structural biology techniques we want to decipher regulatory pathways that can subsequently be manipulated by protein engineering approaches. Small molecule and biologics are utilized as tools for understanding and interfering with the molecular switches that govern the behavior of immune cells. Further information is available at: https://www.bcp.fu-berlin.de/en/chemie/biochemie/research-groups/freund-group/index.html

Please note:

In a first step, the complete application should be uploaded to the online portal (https://fuberlin.moveon4.de/form/60acfece5d328710e40bdbd5/eng) for evaluation by December 15th, 2025.