



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

Open PhD position at FUB for CSC scholarship candidates 2018

Please note: the PhD position is only offered to Chinese PhD candidates for application in the framework of the FUB-CSC PhD Program.

<u>Department/Institute:</u>	Department of Biology, Chemistry, Pharmacy / Institute of Biology-Microbiology
<u>Subject area:</u>	Redox biology of <i>Staphylococcus aureus</i>
<u>Name of Supervisor:</u>	Prof. Dr. Haike Antelmann
<u>Number of open PhD positions:</u>	2
<u>Type of the PhD Study:</u>	Full-time
<u>Project title:</u>	Functional analysis of thiol-switches in the major human pathogen <i>Staphylococcus aureus</i>

PhD Project description:

Staphylococcus aureus is a major human pathogen that can cause local skin or soft tissue infections, but also life-threatening diseases. During infections, *S. aureus* has to cope with reactive oxygen species (ROS) and hypochloric acid (HOCl) that are produced by activated macrophages and neutrophils as major killing mechanism. *S. aureus* uses the low molecular weight thiol bacillithiol (BSH) as protection mechanism against the host immune defense. Under hypochlorite stress, BSH forms mixed disulfides with proteins, termed as S-bacillithiolations as a widespread thiol-protection and redox-switch mechanism. Using the quantitative thiol-redox proteomics approach OxICAT, we recently identified 58 NaOCl-sensitive proteins in *S. aureus* that could play protective roles against the host immune defense. In this project, we will characterize the functions of interesting NaOCl-sensitive thiol-switches in the defense against oxidative stress, including redox regulators, bacilliredoxins, virulence factor and metabolic enzymes. In addition, the Brx-roGFP2 biosensor will be applied to monitor the changes in the BSH redox potential in the *S. aureus* mutants with deletions in redox-controlled proteins.

Language requirements:

IELTS 6.5 or TOEFL 95 ibt.

Academic requirements:

Subject areas suitable for student applications are microbiology, infection biology, biochemistry, redox biology, molecular biology or molecular medicine. Candidates should have some practical experiences in basic microbiology and molecular biological techniques from courses during their study. A Bachelor's degree is sufficient for full time doctorate of 4 years.

Information of the professor or research group leader:

Our group is working in the subject Molecular Microbiology at the Freie University of Berlin. Our research is based on proteomic, transcriptomic, biochemical and genetic approaches to study regulatory mechanisms, targeting, modifications, damage, aggregation and repair mechanisms of proteins in model Gram-positive bacteria, like *Bacillus subtilis* and also more recently in microbial human pathogens, such as *Staphylococcus aureus* and Mycobacteria. Using gel-based proteomics, we defined different subproteomic fractions such as extracellular, membrane- or cell wall-associated proteins to get insights into protein targeting and secretion mechanisms in *Bacillus subtilis*, *S. aureus* and other pathogens. Recent research is also focused on the molecular mechanisms of oxidative and electrophilic stress responses in Gram-positive bacteria. We investigate the changes in the transcriptome and post-translational thiol-modifications caused by ROS and RES in Gram-positive bacteria in the thiol-redox proteome and the regulatory mechanisms of novel redox-sensing regulators. We are further interested in the physiology and thiol-modifications caused by bacillithiol and mycothiol in different Gram-positive

bacteria. We found that bacillithiol and mycothiol play important roles in redox regulation and protection of essential and conserved proteins against irreversible oxidation by protein S-bacillithiolation and protein S-mycothioloation.

For more detailed information about our research and group of Molecular Microbiology, please visit our website:

<http://www.haike-antelmann.de/>

http://www.bcp.fu-berlin.de/en/biologie/arbeitsgruppen/mikrobiologie/ag_antelmann/index.html

Please note: In a first step, the complete application must be submitted to the Beijing Office for evaluation by January 4th, 2018. Please do not contact the professor before. He/She will get in contact with you after having received the complete application via the Beijing Office in January.