Naturwissenschaftlich-Technische Fakultät

UNIVERSITÄT DES SAARLANDES

Der Vorsitzende des Promotionsausschusses

E I N L A D U N G

Hiermit lade ich ein zum öffentlichen Promotionskolloquium von

Herrn M.Sc. Mohamed Ashraf Mostafa Kamal
Wirkstofftransport
(Prof. Dr. Claus-Michael Lehr)

am

Donnerstag, 4. September 2025, 9:00 Uhr s.t.
per Videokonferenz: Link für MS Teams:
https://teams.live.com/meet/3943581832083?p=rT7mg7vo
Raum für die Prüfung: Gebäude: E8 1, Raum: 0.27 (Erdgeschoss)

Thema der Dissertation:

Proteoid Biodynamers and Cell-Penetrating Peptide Conjugates as Tools to Overcome the Gram-negative Bacterial Cell Envelope

This dissertation addresses the challenge of Gram-negative bacterial infections, where the complex outer membrane restricts antibiotic entry. Arginine-based dynamic polymers (ArgBD) were designed to target the lipopolysaccharide (LPS) layer, selectively permeabilizing bacterial membranes while minimizing toxicity to mammalian cells. ArgBD enhanced the potency of antibiotics such as colistin by up to 32-fold. To further improve activity, a multivalent TAT–ArgBD conjugate was developed, combining LPS targeting with strong lipid bilayer disruption. This construct exhibited rapid bactericidal action, broad activity against Gram-negative and Gram-positive bacteria, and synergized with several antibiotics, lowering their effective doses by up to 256-fold. The work demonstrates that rationally engineered peptide–polymer systems can overcome bacterial envelope barriers, potentiate existing antibiotics, and represent promising candidates for combating multidrug-resistant infections.

Saarbrücken, 21. August 2025

Prof. Dr.-Ing. Georg Frey