



Der Vorsitzende des Promotionsausschusses

EINLADUNG

Hiermit lade ich ein zum öffentlichen Promotionskolloquium von

Herrn M.Sc. Selim Basaran
Kolloid- und Grenzflächenchemie
(Prof. Dr. Tobias Kraus)

am

Dienstag, 19. August 2025, 13:00 Uhr s.t.

per Videokonferenz: Link für MS Teams: <https://bit.ly/46wuwuf>

Raum für die Prüfung: INM, Gebäude D2.5; Leibniz Saal

Thema der Dissertation:

Thermoplasmonic stimulation of gold nanorods for engineered living materials

Engineered Living Materials (ELMs) with living cells in polymer gels enable the controlled release of therapeutic molecules. ELMs incorporating thermoresponsive *ClearColi* or *E. coli* Nissle 1917 were embedded in Pluronic or PVA hydrogels containing thermoplasmonic gold nanorods (AuNRs). Upon 808 nm near-infrared irradiation, AuNRs generated localized heat, enabling activation of bacterial gene expression. In bilayer constructs, heat diffused from the AuNR-containing upper layer to trigger mCherry expression in the bottom bacterial layer. Spatial temperature profiles and fluorescence confirmed controlled activation. For therapeutic applications, a single-layer format was developed where *E. coli* Nissle 1917 produced the VEGF-mimetic QK peptide, with secretion monitored via Nanoluciferase. The system was translated to nanocomposite PluDA hydrogels integrated into 3D-printed optical waveguides. Segmented and core-shell fiber architectures enabled spatially confined thermoplasmonic heating.

Saarbrücken, 5. August 2025

Prof. Dr.-Ing. Georg Frey