University of Basel

Swiss Nanoscience Institute

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Center of Excellence supported by the University of Basel and the Canton of Aargau

Multi-compartment nanofactories for on-site and on-demand drug synthesis and delivery

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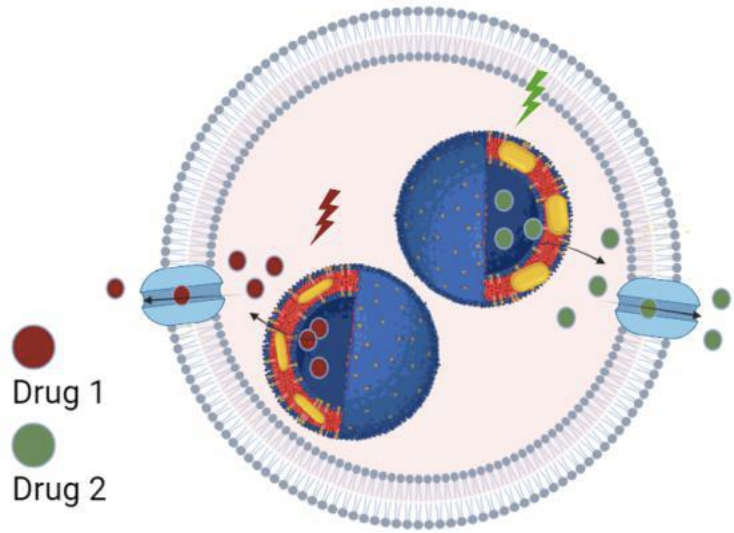
We are looking for a PhD student for a joint research activity between the Biointerfaces Group at the University of Applied Sciences & Arts Northwestern Switzerland (https://www.fhnw.ch/en/research-and-services/lifesciences/chemistry-and-bioanalytics/biointerfaces) and the Palivan Group at the University of Basel (https://palivan.chemie.unibas.ch/en/). The student will moreover become a member of the Swiss Nanoscience Institute (SNI) PhD school and will benefit from personal support, a strongly interdisciplinary social environment, training in soft skills offered by the PhD program, and many internal SNI events. The position will start as soon as possible after January 1st 2023.

Project description: Combining multiple drugs with complementary modes of action has been shown to provide synergistic and additive efficacy in cancer chemotherapy.[1,2] However, the distinct pharmacokinetics of individual drugs often result in non-coordinated biodistribution and suboptimal accumulation at the tumour site.[3] Consequently, novel strategies are emerging for targeted and simultaneous delivery of anti-cancer drugs or prodrugs using nanocarriers . However, it remains a formidable challenge to deliver distinct therapeutic agents in a single carrier with an independent control over the release of each drug type. In this project, we aim to address this challenge by developing the next generation of drug delivery systems with internal compartments, which can be triggered selectively and independently to release their content. We will utilize self-assembly and encapsulation approaches to create selectively-triggerable individual compartments based on 'smart' nanocarriers, and to integrate them into single larger vesicles ('nanofactories') in a bottom-up manner (**Scheme 1**). To achieve this ambitious goal, this study takes advantage of established expertise and experimental capabilities in both collaborating labs.



Scheme 1. The 'nanofactory' with multiple 'smart' internal compartments that can be triggered individually and independently.

We expect candidates to have a relevant background in organic or polymer chemistry and synthesis (must). Experience with developing self-assembled nanostructures would be a plus. Over the course of the project, the candidate will acquire a wide range of skills in: self-assembly, microfluidics, imaging tools (AFM, fluorescence, SEM, TEM), and cell culture techniques.

Applications should be made online at: phd.nanoscience.ch.

Please consider applying early, since the decision to fill the vacancy can be taken at any time in the process.

For further information, contact Prof. Oya Tagit : oya.tagit@fhnw.ch

[1] N.M. Ayoub, *Front. Oncol*. **2021**, 11, 708943
[2] Q. Hu, W. Sun, C. Wang, Z. Gu, *Adv Drug Deliv Rev*, **2016**, 98, 19
[3] R.B. Mokhta ri, T.S. Homayouni, et al. *Oncotarget* **2017**, 8, 38022