

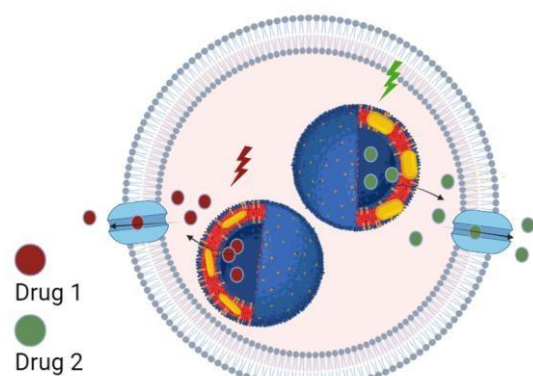


Multi-compartment nanofactories for on-site and on-demand drug synthesis and delivery

PI: Prof. Dr. Oya Tagit, Institute of Chemistry and Bioanalytics, University of Applied Sciences & Arts Northwestern Switzerland

Co-PI: Prof. Dr. Cornelia Palivan, Chemistry Department, University of Basel

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



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

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: Biointerfaces Group at the University of Applied Sciences & Arts Northwestern Switzerland (<https://www.nanobiointerfaces.ch>) and Palivan Group at the University of Basel (<https://palivan.chemie.unibas.ch/en/>).

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. Mokhtari, T.S. Homayouni, et al. *Oncotarget* **2017**, 8, 38022