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Phase separation in lipid-based nanoparticles: exploring the nano-bio interface

Papadopoulou, P.

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List of publications

1. Arias-Alpizar, G.[#]; **Papadopoulou, P.[#]**; Rios, X.; Reddy Pulagam, K.; Moradi, M.-A.; Pattipeiluhu, R.; Bussmann, J.; Sommerdijk, N.; Llop, J.; Kros, A.; Campbell, F. Phase-separated liposomes hijack endogenous lipoprotein transport and metabolism pathways to target subsets of endothelial cells *in vivo*. *Advanced Healthcare Materials* **2022**, *12* (10), 2202709.
2. **Papadopoulou, P.[#]**; van der Pol, R.[#]; van Hilten, N.[#]; Moradi, M.A.; Ferraz, M.J.; Aerts, J.M.F.G.; Sommerdijk, N.; Risselada, H.J.; Sevink, G.J.A.; Kros, A. Lipase-mediated selective hydrolysis of lipid droplets in phase-separated liposomes. *ChemRxiv* **2023**, DOI: 10.26434/chemrxiv-2023-9q9wh-v3. **In revision with Advanced Materials**
3. **Papadopoulou, P.[#]**; Arias-Alpizar, G.[#]; Weeda, P.; Poppe, T.; van Klaveren, N.; Slíva, T.; Aschmann, D.; van Os, W.L.; Zhang, Y.; Moradi, M.A.; Sommerdijk, N.; Campbell, F.; Kros, A. Structure-function relationship of phase-separated liposomes containing diacylglycerol analogues. **Ready for submission**
4. Escalona Rayo, O.[#]; **Papadopoulou, P.[#]**; Slutter, B.; Kros, A. Biological recognition of RNA-lipid nanoparticles. *Current Opinion in Biotechnology* **2023**.
5. Zhou, X.; Wang, P.; Ramu, V.; Zhang, L.; Jiang, S.; Li, X.; Abyar, S.; **Papadopoulou, P.**; Shao, Y.; Bretin, L.; Siegler, M.A.; Buda, F.; Kros, A.; Fan, J.; Peng, X.; Sun, W.; Bonnet, S.; *In vivo* metallophilic self-assembly of a light-activated anticancer drug. *Nature Chemistry* **2023**, *15*, 980–987.
6. Zeng, Y.; Senti, M. E.; Labonia, M.C.I.; **Papadopoulou, P.**; Brans, M.A.D; Dokter, I.; Fens, M.H.; van Mil, A.; Sluijter, J.P.G.; Schiffelers, R.; Vader, P.; Kros, A. Fusogenic coiled-coil peptides enhance lipid nanoparticle-mediated mRNA delivery upon intramyocardial administration. **In revision with ACS Nano**
7. Xie, Y.; **Papadopoulou, P.**; Wit, B. de; D'Engelbronner, J.C.; Hage, P. van.; Kros, A.; Schaaf, M.J.M. Two types of liposomal formulations improve the therapeutic ratio of prednisolone phosphate in a zebrafish model for inflammation. *Cells* **2022**, *11*(4), 671.

8. Zhou, X.Q.; Mytiliniou, M.; Hilgendorf, J.; Zeng, Y.; **Papadopoulou, P.**; Shao, Y.; Dominguez, M.P.; Zhang, L.; Hesselberth, M.B.S.; Bos, E.; Siegler, M.A.; Buda, F.; Brouwer, A.M.; Kros, A.; Koning, R.I.; Heinrich, D.; Bonnet, S. Intracellular dynamic assembly of deep-red emitting supramolecular nanostructures based on the Pt...Pt metallophilic interaction. *Advanced materials* **2021**, 33(37), 2008613.
9. Arias-Alpizar, G.[#]; Kong, L.[#]; Vlieg, R.C.; Rabe, A.; **Papadopoulou, P.**; Meijer, M.S.; Bonnet, S.; Vogel, S.; van Noort, J.; Kros, A.; Campbell, F; Light-triggered switching of liposome surface charge directs delivery of membrane impermeable payloads in vivo, *Nature Communications* **2020**, 11, 3638.
10. Zhou X.Q.; Xiao M.; Ramu V.; Hilgendorf J.; Li X. Z.; **Papadopoulou, P.**; Siegler, M.A.; Kros, A.; Sun, W; Bonnet, S. The self-assembly of a cyclometalated palladium photosensitizer into protein-stabilized nanorods triggers drug uptake *in vitro* and *in vivo*. *Journal of the American Chemical Society* **2020**, 142(23): 10383-10399.
11. Bąk, K.M.; van Kolck, B.; Masłowska-Jarżyna, K.; **Papadopoulou, P.**; Kros, A.; Chmielewski, M.J.; Oxyanion transport across lipid bilayers: direct measurements in large and giant unilamellar vesicles. *Chemical Communications* **2020**, 56(36): 4910-4913.

[#]These authors contributed equally

Conferences and Symposia

NanoBio conference 2023, Heraklion Greece (oral presentation)
LACDR spring symposium 2023, Leiden University (invited oral presentation)
ICMS meeting 2023, Eindhoven Institute of Technology (poster presentation)
CHAINS 2022, Veldhoven the Netherlands (oral presentation)
TIDES 2022, Vienna Austria (poster presentation)
CHAINS 2019, Veldhoven the Netherlands (poster presentation)
NanoBioMed 2019, Barcelona Spain (poster presentation)
Figon Dutch Medicine Days 2018, Twente the Netherlands (poster presentation)

Biography

Panagiota Papadopoulou obtained her B.Sc. in Chemistry in 2014 from the National Kapodistrian University of Athens, Greece. Her diploma thesis, titled "Qualitative Determination of Azo-Dyes in Vegetable Oil by LC-MS/MS" was conducted at the department of Analytical Chemistry, in the lab of Prof. dr. Nikolaos Thomaidis.

In parallel with her bachelor's studies, she gained work experience as a QC laboratory assistant at the BIOCHALKO group of companies in 2012 for 9 months, and worked as an external intern at the National Center for Scientific Research (NCSR) "Demokritos" at the Institute of Nanoscience and Nanotechnology in 2014 for 8 months. As a QC assistant, Panagiota gained experience on the chemical analysis of industrial waste and ISO accreditation processes. In NCSR, she gained experience on the application of nanotechnology in the field of renewable energy.

In 2017, she received her M.Sc. degree in Life Science and Technology with specialization in Research and Development from the Leiden Institute of Chemistry at Leiden University, the Netherlands. She finalized her M.Sc. diploma thesis with the title "Development of Liposomes for Targeting the Blood-Brain Barrier *in vivo*." During her M.Sc. studies, she also worked as a laboratory assistant at the university for 2 months.

In the same year (2017), she began her Ph.D. journey at the Supramolecular and Biomaterials Chemistry group at Leiden Institute of Chemistry, after receiving the 2017 Leiden/Huygens Fellowship prize. Her Ph.D. supervisors were Prof.dr. Alexander Kros and Prof.dr.ir. John van Noort. During her Ph.D., she focused on the investigation of the physicochemical properties of lipid-based nanoparticles and their influence on nanoparticle behavior. Specifically, her research aimed to understand nanoparticle - protein interactions *in vivo* and *in vitro*, and how lipid phase separation can result in cell selectivity. For her observations, Panagiota incorporated various chemical and biological methods and utilized characterization techniques such as cryo-electron microscopy, for which she received certified training from the Eindhoven Institute of Technology (TUE) and the Netherlands Center of Electron Nanoscopy (NeCEN). Since 2022, Panagiota is working as a post-doctoral researcher at the same department in Leiden University, collaborating closely with Liposoma Ltd. and the Netherlands Cancer Institute (NKI).

“We are all time travelers, journeying together into the future. Let us work together to make that future a place we want to visit. Be brave, be determined, overcome the odds. It can be done.”

Stephen Hawkin, 2018