

Padryk Elwyn Merkl

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EDUCATION

- 2017/10-2022/05: **PhD Medical Science, Karolinska Institutet**
Thesis Title: “Responsive Nanostructured Materials for Bioanalyte Detection and Triggered Antimicrobial Therapy” Defended: 20-05-2022
Advisor: Dr. Georgios A. Sotiriou
- 2012/09-2017/07: **Master of Chemical Physics, The University of Edinburgh**
2:1 Honours with Industrial Experience
Master’s project: “An *Ab-initio* Study of Noble Gas Hydrates”
Supervisor: Prof. Andreas Hermann

EMPLOYMENT HISTORY

- 2023/12-CURRENT: **Swedish research council international postdoctoral fellow
ETH Zürich**
Mucus-degrading enzymes for pulmonary drug delivery and therapy
- 2023/06-2023/12: **Senior Material Scientist, AstraZeneca**
Oral product development
- 2022/06-2023/05: **Postdoctoral Researcher, Karolinska Institutet**
Advisor: Dr. Georgios A. Sotiriou
Developing down-converting inorganic phosphorescent nanoparticles for in-vivo imaging and targeted delivery across the blood brain barrier
- 2015/07-2016/09: **Industrial placement, Unilever (Bedford, UK)**
Advisor: Dr. Paul Pudney
Confocal Raman spectroscopy to study hair protein secondary structure

AWARDS AND GRANTS

- 2025 Novartis Freenovation Grant
- 2025 ETH Zürich Seed Grant
- 2023/12-2026/12 Swedish research council international postdoc grant
- 2023/09 PhD thesis award from the German Society for Aerosol Research (GAeF)
- 2022/11 Poster award Fall Materials Research Society Meeting 2022, Boston, U.S.A.
- 2022/09 Poster award International Aerosol Conference, Athens, Greece
- 2021/06 Poster award Scandinavian Society for Biomaterials Annual Meeting, Online
- 2019 Teaching award for “Disease and Illness DSM 2.1” at Karolinska Institutet

PUBLICATIONS

* indicates co-first authorship

1. [Stability of Hydrogen Hydrates from Second-Order Møller–Plesset Perturbation Theory.](#) Košata J., **Merkl P.**, Teeratchanan P. and Hermann A. (2018) The Journal of Physical Chemistry Letters, 9, p. 5624-5629
2. [Luminescent \$CeO_2\$: \$Eu^{3+}\$ nanocrystals for robust in situ \$H_2O_2\$ real-time detection in bacterial cell cultures.](#) Henning, D. F., **Merkl, P.**, Yun, C., Iovino, F., Xie, L., Mouzourakis, E., Moularas, C., Deligiannakis, Y., Henriques-Normark, B., Leifer, K. and Sotiriou, G. A. (2019) Biosensors and Bioelectronics, 132, 286-293

3. Silica-coated phosphorescent nanoprobe for selective cell targeting and dynamic bioimaging of pathogen–host cell interactions. Iovino, F., **Merkel, P.**, Spyrogianni, A., Henriques-Normark, B. and Sotiriou, G. A. (2020) *Chemical Communications*, 56, 6989–6992.
4. Flame-Made Calcium Phosphate Nanoparticles with High Drug Loading for Delivery of Biologics. Tsikourkitoudi, V., Karlsson, J., **Merkel, P.**, Loh, E., Henriques-Normark, B. and Sotiriou, G. A. (2020) *Molecules*, 25, 1747.
5. Mannose receptor-derived peptides neutralize pore-forming toxins and reduce inflammation and development of pneumococcal disease. Subramanian, K., Iovino, F., Tsikourkitoudi, V., **Merkel, P.**, Ahmed, S., Berry, S. B., Aschtgen, M., Svensson, M., Bergman, P., Sotiriou, G. A. and Henriques-Normark, B. (2020) *EMBO Molecular Medicine*, 12.
6. Biofilm interfacial acidity evaluation by pH-Responsive luminescent nanoparticle films. **Merkel, P.**, Aschtgen, M.-S., Henriques-Normark, B. and Sotiriou, G. A. (2021) *Biosensors and Bioelectronics*, 171, 112732.
7. The Effect of the Molecular Weight of Polyvinylpyrrolidone and the Model Drug on Laser-Induced In Situ Amorphization. Hempel, N.-J., **Merkel, P.**, Knopp, M. M., Berthelsen, R., Teleki, A., Hansen, A. K., Sotiriou, G. A. and Löbmann, K. (2021) *Molecules*, 26, 4035.
8. Antiviral Activity of Silver, Copper Oxide and Zinc Oxide Nanoparticle Coatings against SARS-CoV-2. **Merkel, P.***, Long, S.*, McInerney, G. M. and Sotiriou, G. A. (2021) *Nanomaterials*, 11(5), 1312.
9. Utilizing Laser Activation of Photothermal Plasmonic Nanoparticles to Induce On-Demand Drug Amorphization Inside a Tablet. Hempel, N.-J., **Merkel, P.**, Asad, S., Knopp, M. M., Berthelsen, R., Bergström, C. A. S., Teleki, A., Sotiriou, G. A. and Löbmann, K. (2021) *Molecular Pharmaceutics*, 18, 2254–2262.
10. Plasmonic Coupling in Silver Nanoparticle Aggregates and Their Polymer Composite Films for Near-Infrared Photothermal Biofilm Eradication. **Merkel, P.**, Zhou, S., Zaganiaris, A., Shahata, M., Eleftheraki, A., Thersleff, T. and Sotiriou, G. A. (2021) *ACS Applied Nano Materials*, 4, 5330–5339.
11. The Influence of Drug–Polymer Solubility on Laser-Induced In Situ Drug Amorphization Using Photothermal Plasmonic Nanoparticles. Hempel, N.-J., **Merkel, P.**, Knopp, M. M., Berthelsen, R., Teleki, A., Sotiriou, G. A. and Löbmann, K. (2021) *Pharmaceutics*, 13(6), 917.
12. SERS Hotspot Engineering by Aerosol Self-Assembly of Plasmonic Ag Nanoaggregates with Tunable Interparticle Distance. Li, H., **Merkel, P.**, Sommertune, J., Thersleff, T. and Sotiriou, G. A. (2022) *Advanced Science*, 2201133
13. Highly durable photocatalytic titanium suboxide–polymer nanocomposite films with visible light-triggered antibiofilm activity. Bletsas, E., **Merkel, P.**, Thersleff, T., Normark S., Henriques-Normark B., Sotiriou, G.A. (2023) *Chemical Engineering Journal*, 454, 139971
14. STAT3 deficiency alters the macrophage activation pattern and enhances MMP9 expression during staphylococcal pneumonia Farmand S., Sender V., Karlsson J., **Merkel, P.**, Normark S., Henriques-Normark B. (2024) *The Journal of Immunology*, 212(1), 69-80
15. Customizable Fabrication of Photothermal Microneedles with Plasmonic Nanoparticles Using Low-Cost Stereolithography Three-Dimensional Printing Ziesmer J., Sondén I., **Merkel, P.**, Sotiriou, G.A. (2024) *ACS Applied Bio Materials*, 7, 4533–4541
16. Prevention of uropathogenic E. coli biofilm formation by hydrophobic nanoparticle coatings on polymeric substrates Dietl S.*, **Merkel, P.***, Sotiriou, G.A. (2024) *RSC Applied Interfaces*, 1, 667-670
17. Paper-based colorimetric hyperammonemia sensing by controlled oxidation of plasmonic silver nanoparticles **Merkel, P.**, Sotiriou, G.A. (2024) *Nanoscale Advances*, 6, 2586-2593

18. [Enzymatic absorption promoters for non-invasive peptide delivery](#) Bohley Steiger M., Steinauer A., Gao D., Klein Cerrejon D., Krupke H., Heussi M., **Merkel, P.**, Klipp A., Burger M., Martin-Olmos C., Leroux J.-C. (2025) *Journal of Controlled Release*, 382, 113675
19. [Overcoming the gastrointestinal mucus barrier: Zinc-dependent modulation of mucinase activity](#) **Merkel, P.***, Ivana Vukšinić*, Leroux J.-C., Bohley Steiger M. (2026) *International Journal of Pharmaceutics*, 688, 126445