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Forskning

My research is focused on the development of biosensors based on the optical properties of semiconductor nanowires for the detection of biomolecules. These devices could be applied for diagnostics by the detection of biomarkers of disease at early stages and for performing sensitive biological measurements.
In particular, we work with III-V group semiconductor nanowires, such as GaP. Due to their lightguiding properties, they behave like nano-optical fibers and are able to collect and guide the light from close-bound fluorescent molecules. Our aim is to explore and take advantage of these optical properties to build sensitive sensors that enhance the performance and surpass the limit of detection of conventional flat sensing surfaces.
In combination with model membrane systems such as supported lipid bilayers (SLB), it is also possible to create biomimetic systems to study relevant cellular interactions with the enhanced sensitivity offered by nanowires. In order to improve the efficiency of drug-delivery nanocarriers, we emulate and study the interactions between cell membranes and lipid nanoparticles designed for the delivery of mRNA-based drugs. We expect to get a better understanding on the mechanisms responsible of mRNA endosomal escape and thus, improve the efficacy of the treatment.

Kvalifikationer

Advanced Nanoscience and Nanotechnology, MSc, Autonomous University of Barcelona

Biotechnology, BSc, University of Granada

Anställning

Doktorand

Fasta tillståndets fysik
Lunds universitet
Lund, Sverige
2022 feb. 15 → present

Doktorand

NanoLund: Centre for Nanoscience
Lunds universitet
Lund, Sverige
2022 feb. 15 → present

Forskare

Fysikalisk kemi
Lunds universitet
Lund, Sverige
2022 mars 29 → present

Profilområdesmedlem

LTH profilområde: Teknik för hälsa
Lunds universitet
Sverige
2022 juni 24 → present

Profilområdesmedlem
LTH profilområde: Nanovetenskap och halvledarteknologi
Lunds universitet
Sverige
2022 aug. 27 → present

Profilområdesmedlem
LU profilområde: Ljus och material
Lunds universitet
Sverige
2023 jan. 1 → present

Forskningsoutput

Sub-Nanomolar Detection of Oligonucleotides Using Molecular Beacons Immobilized on Lightguiding Nanowires
Johansson, T. B., Davtyan, R., Valderas-Gutiérrez, J., Gonzalez Rodriguez, A., Agnarsson, B., Munita, R., Fioretos, T., Lilljebjörn, H., Linke, H., Höök, F. & Prinz, C. N., 2024, I: Nanomaterials. 14, 5, 453.

Enhanced Optical Biosensing by Aerotaxy Ga(As)P Nanowire Platforms Suitable for Scalable Production
Valderas Gutiérrez, J., Davtyan, R., Sivakumar, S., Anttu, N., Li, Y., Flatt, P., Shin, J. Y., Prinz, C., Höök, F., Fioretos, T., Magnusson, M. H. & Linke, H., 2022 juli 1, I: ACS Applied Nano Materials.

Enhanced human T cell expansion with inverse opal hydrogels†
Santos, F., Valderas Gutiérrez, J., Pérez del Río, E., Castellote-Borrell, M., Rodriguez Rodriguez, X., Veciana, J., Ratera, I. & Guasch, J., 2022 juni 6, I: Biomaterials Science.

Aktiviteter

Nanowire Week 2022
Julia Valderas Gutiérrez (Talare)
2022 apr. 25 → 2022 apr. 29

Projekt

Development of advanced detection methods for biomolecules on nanostructured surfaces
Valderas Gutiérrez, J., Linke, H. & Höök, F.
2022/02/15 → …