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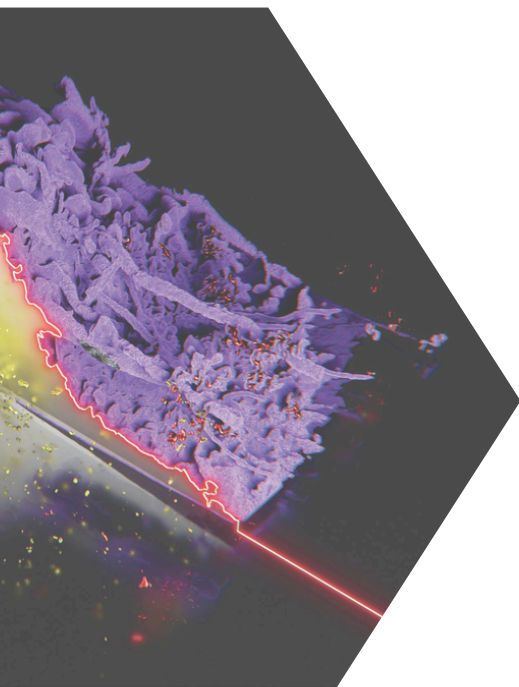
2024 Activities - Powered by People

BioNanomaterials Group

Alke Fink & Barbara Rothen-Rutishauser



Message from Profs. Fink & Rothen-Rutishauser



As we reflect upon 2024, the BioNanomaterials Group proudly highlights a year marked by scientific progress, creativity, and, above all—**the people who made it possible.**

At the intersection of materials science and biology, our work continues to foster innovation and interdisciplinary collaboration. This year, our **exceptionally diverse team—spanning many nationalities and scientific disciplines—**successfully bridged fundamental research and impactful applications, embodying the spirit of interdisciplinary inquiry.

Our cohesion strengthened amid dynamic changes, including farewells to valued collaborators embarking on new career paths and warm welcomes to fresh talent. Two group retreats allowed us to collectively **establish guiding principles, identify our strengths, and address areas for improvement.**

Highlights from 2024 reflect our group's vitality and strong commitment to societal engagement, and we invite you to explore these moments and more in the following pages and wish you an inspiring and enjoyable read.

Looking forward, we remain dedicated to advancing our understanding of BioNano-materials, fostering innovation, and confronting societal challenges, united by a shared vision of excellence, curiosity, and impactful scientific contribution.



Research Highlights

GOLD NANOSTARS

DETECTING NANOPLASTICS AT NANOGRAM CONCENTRATIONS

Mar Pollut Bull 203: 116468 (2024)

GLIOBLASTOMA IMMUNOTHERAPY

USING IMMUNOSTIMULATORY NANOPARTICLES

Drug Delivery and Translational Research 14:2655 (2024)

MACHINE LEARNING

A SHORTCUT TO ELECTRON MICROSCOPY IN PARTICLE ANALYSIS

J.Phys.Chem. C 128/1:421 (2024)

COUNTING AT THE LIMIT

DETECTING GOLD NANOPARTICLES IN MACROPHAGES USING FIB-SEM

Nanoscale Adv 6:18 (2024)

BRIDGING THE GAP

ALIGNING KEY EVENTS IN ANIMAL AND HUMAN LUNG MODELS

Chem Res Toxicol 37:10 (2024)

OUR OPINION

WHAT DRIVES NANOPARTICLE INTERACTION WITH CELL MEMBRANES

Current Opinion in Biotechnology 87:103128 (2024)

Activities

1

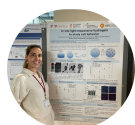
Teaching Activities



The BioNanomaterials group remained **committed to educational development through diverse initiatives**. We supervised interns and summer students, fostering their research and professional skills. The team participated in "Futur en tous genres", kidsUni, and similar outreach programs to inspire the next generation. At HEIA-FR, we contributed to apprentice education (**Laetitia Haeni**). Additionally, our mentoring activities created valuable opportunities for collaborative learning and professional growth across multiple disciplines.

2

Conferences



The BioNanomaterials group maintained a strong presence in the scientific community with **over 30 presentations at local, national, and international conferences**, including both poster and oral contributions. We participated in events such as the NCCR Bio-inspired Materials Annual Conference, Swiss NanoConvention, Swiss Chemical Society Fall Meeting, European Congress on Alternatives to Animal Testing, and Microplastics meetings.

Team members distinguished themselves by **winning poster and presentation awards**, successfully securing funding for conference attendance, and demonstrating **leadership** through session chairing activities, further enhancing our visibility and impact in the field.

Awards

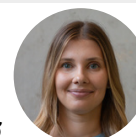


4

The BioNanomaterials group continued to receive prestigious recognition for our scientific excellence in 2024. Notable achievements included **Dr Jessica Caldwell's faculty prize** for the best experimental thesis. **Henry Lee** secured the distinguished **Thürler-Reeb award** and placed second in the MT180 competition. **Isidora Loncarevic** earned both the **Young Scientist Travel Award** and **Best Talk Award from EUSAAT**. Additionally, she achieved third place in the Falling Walls Lab competition. Congratulations!

3

Funding



Notable grants included **DAAD** funding (**Dr Nathalie Jung**) and an SNSF **Spark** project (**Dr Ruiwen He**) entitled "Detection of volatile organic compound (VOC) emission biomarkers for human lung cells".

We could also welcome two new postdoctoral researchers into the group (**Drs Rani-Borges & Gomes-Dare**), who secured prestigious fellowships from the São Paulo Research Foundation (FAPESP), enabling them to join our team for one year. Ph.D. candidate **Viktoriya Ivasiv** (University of Minho, Portugal) secured a 12-month Swiss Government Excellence Scholarship to study Drug Nanocarriers in Lung Models in our group, and **Mounia Kias** (École Nationale Supérieure d'Informatique) did a 6-month industry-funded internship in the field of image analysis.

Dr Patricia Taladriz-Blanco assumed a leading role in the **COST** action "ISO compatible, efficient and reproducible protocols/ equipment for micro-nanoplastic detection through machine-learning," further strengthening our position at the forefront of microplastics detection and analysis through international collaborative networks.

More Activities

Outreach

5



As part of the NanoArts program, the “Bigger Picture” project was developed over 2 years by artist **Yvo Goette** and scientist **Alke Fink**. **Barbara Rothen-Rutishauser** was invited by Film for the Earth to comment on the documentary “Plastic People” at Cinematte in Bern. As a member of the Swiss Micro- and Nanotechnology network, **Barbara Rothen-Rutishauser** was involved in organising the Trends in Micro Nano event in Fribourg for the local Industry, and together with **Alke Fink**, they presented on material analytics as basis for innovation.

6

Swiss NanoAnalytics

Drs Kata Dorbiç, Amelie Bazzoni, Mauro Sousa de Almeida & Sandor Balog



We successfully hosted the second **Swiss NanoAnalytics Open Door Day in 2024**, welcoming industrial and regulatory partners to explore our analytical service platform and research facilities. The event was distinguished by the participation of both directors from the Fribourg Chamber of Commerce and Industry and the Economic Development for the Canton of Fribourg, who delivered valuable addresses to attendees. We were particularly pleased with the productive discussions that took place and the promising future collaborations that emerged during this strategic networking opportunity, further strengthening our connections with key stakeholders in the region and across Switzerland.

7

Graduation & Promotions

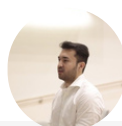
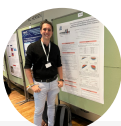


We extend our heartfelt congratulations to our graduating and promoted team members for their exceptional contributions to our research group. **Dr Jessica Caldwell** completed her PhD and has moved to the prestigious "Smart Materials" group at Istituto Italiano di Tecnologia in Genoa. **Dr Aura Moreno** successfully defended her PhD thesis, marking an important milestone in her scientific career. We are proud of **Dr Flavia Sousa**, who has secured a Tenure Track Position at the University of Groningen.

We are grateful to all of you for your hard work and wish you continued excellence in your new roles and future endeavors!

8

Collaboration



Our research group significantly expanded its collaborative network in 2024. We initiated several new industrial collaborations while strengthening our existing partnerships with companies across various sectors. We also continued and launched new academic collaborations with universities, hospitals, and engineering schools throughout Switzerland, Europe, and worldwide. We extend our heartfelt appreciation to our valued partners at ZHAW, with whom we've built a successful history of collaborative projects and shared talented researchers (doctoral candidates **Aref Enayati & Sergio Mingo Barba**). The continued support and engagement from both our established and new partners have been instrumental in advancing our scientific objectives and broadening our research impact.



Fatima HAMEEDAT



Dr Aura MORENO ECHEVERRI



Dr Sandeep KESHAVAN

Collaborators leaving BioNano in 2024

Thanks for your support!



Assistant Prof Flávia SOUSA



Viktoriya IVASIV



Dr Anne-Marinette CAO