2024 Annual Report

Department of Biomaterials and Biomedical Technology (BBT)

UMCG

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umcg

Hélder Almeida Santos
Head of the department

FOREWORD

Hereby, it is my great pleasure to present the second Annual Report of the Department of The Department of Biomaterials and Biomedical Technology (BBT) at the University Medical Center Groningen (UMCG).

BBT stands at the forefront of integrating engineering principles with medical sciences to advance healthcare solutions. BBT's major mission it to provide solutions to answer to medical problems. A cornerstone of BBT's success has been our unwavering focus on interdisciplinary collaboration. Specifically in teams within 9 major top-level research areas (https://umcgresearch.org/w/biomaterials-and-biomedical-technology), with a very strong collaborative, inter- and multi-disciplinary, and technology-oriented approaches. We have also fostered partnerships with experts in materials science, engineering, medicine, pharmacy, regenerative medicine, and molecular biology, leading to groundbreaking projects that address some of the most pressing challenges in biomedical research. BBT's current contributions to tissue engineering, regenerative medicine, and personalized treatment approaches are redefining what will be possible in modern medicine.

BBT's long-term goals are to: (1) become a world-class innovative department on biomaterials and biomedical engineering; and (2) become nationally and internationally renowned for our cutting-edge biomedical science for clinical translation, teaching excellence and top-class facilities.

BBT's short-term goals are to: (1) attract competitive external grants (e.g., ERC, MSCA, Veni/Vidi/Vici); (2) publish impactful research work in leading journals; (3) strive for excellent education related to the biomedical engineering aspects, always with an innovation and clinical translation mind-set; (4) attract top-level researchers of

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all levels of seniority; (5) partner with industry for co-creation and co-innovation; (6) develop novel bio-medical tools and technologies; and (7) keep always in mind the public engagement, communication and dissemination of our main activities.

In 2024, BBT has grown significatively, now with +100 people, corresponding to a majority of PhD students (+60) and postdocs (+15), closely supervised with BBT's talent PIs of all levels of seniority ranging from University Docents to Full Professors (11), and strongly supported by the amazing technical and management teams (12). For the past year, we have also increasingly aimed to enhance the diversity and multiculturality within the department, now with a higher gender balance than before, with +42% of women researchers, and an overall department population over ca. 20 different countries.

BBT's PIs also secured an amazing +3.9 M€ in external research funding, and 2024 ended with an outstanding news of a major regional funding, where BBT´s PIs were among the receivers of the 'The Ubbo Emmius Foundation' award to HTRIC worth of €18.4 million– congratulations to all!

BBT's early-stage researchers, our PhD students, were also brilliant and some were among the first to win the competition on the Precision Institute collaborative research grants – congratulations to all and success to the exciting projects!

Moreover, BBT has also achieved significant publications, with a total of +135 articles published and 12 new Doctors of Philosophy (PhDs) in the different areas of BBT's core research work – congratulations to all our new Doctors!

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BBT's milestones across the various research domains, led to outstanding research achievements, among many others, were:

- Under the leadership of Professor Hélder Santos, the group has made pioneer advances in nanomedicines for cardiac therapy by developing nanotechnologies for gene delivery to the myocardium infarction reported in Nature Communications (https://doi.org/10.1038/s41467-024-49804-x), as well as applied microneedle technologies for targeted drug delivery and cancer immunotherapy. The group's paper on 'A translational framework to DELIVER nanomedicines to the clinic' published in Nature Nanotechnology (https://doi.org/10.1038/s41565-024-01754-7) has been very well received by the scientific community.
- Led by Professor Henny van der Mei, the group has made strides in understanding and preventing infections related to biomaterial implants. The group has developed innovative nanoparticle-based systems for antibacterial applications.
- The research work led by Professor Romana Schirhagl has led to the creation of a startup company, QT Sense (https://www.qtsense.com/) for delivering nanodiamonds into tissues, in order to study cellular processes.
- Other examples, include innovations in wound healing biomaterials, where BBT researchers have explored copper-incorporated biomaterials, such as bioactive glasses and hydrogels, demonstrating their potential in promoting wound healing and offering broad-spectrum antibacterial effects.
- BBT has also continued to play a pivotal role in the education and training of the next generation of biomedical engineers and clinicians. Through our innovative teaching participation and coordination in Biomedical Engineering and Molecular Medicine and Innovative Treatment programs, we are shaping the future leaders of the healthcare and medical technology sectors. In this regard, from December 9 to 12, BBT organized a very successful 'Science without Borders: From Fundamental Sciences to Biomedical Applications' Symposium. This event hosted a large delegation of international researchers from the National Autonomous University of Mexico and UMCG/RUG, fostering collaboration and knowledge exchange in the field of biomedical technology and engineering.

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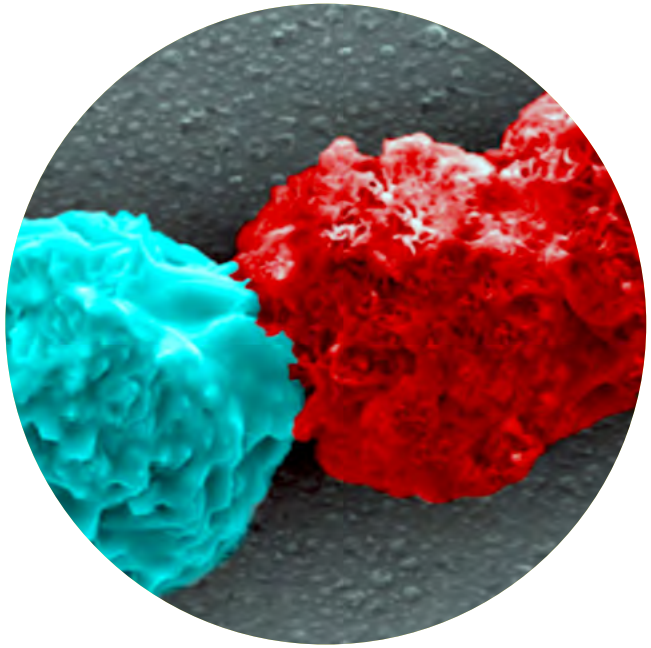
As I look toward the future, BBT remains dedicated to pushing the boundaries of what is possible, harnessing the power of innovation, technology and science toward the improvement of patient care and quality of life. BBT's achievements of 2024 reflect the collective efforts of our dedicated team of researchers, faculty, students, supporting staff and collaborators, all working together with a shared vision of advancing biomedical technology for the benefit of society. I am very proud of the milestones we've reached this year and excited about the continued growth and impact of BBT in the years to come.

In 2025, I foreseen that the BBT will continue inspiring, training, and supporting the next generation of researchers, educators and innovators in the key BBT's focus research other areas: Together we will achieve more, faster and further.

Sincerely,

Hélder Almeida Santos
Head of Department



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RESEARCH AT BBT

1

The Department of Biomaterials and Biomedical Technology (BBT) at UMCG is at the forefront of innovative research aimed at revolutionizing healthcare. BBT's research work lies at the intersection of materials science, engineering, biology, and medicine, among others, focusing on developing new biomaterials and biomedical technologies that enhance patient care and improve treatment outcomes.

The year 2024 has been a remarkable for BBT, marking a significant milestone in the advancement of cutting-edge biomedical technology research and innovation. Our commitment to transforming healthcare through the development of novel biomaterials, medical technologies, and treatments has propelled us toward remarkable achievements, strengthening our reputation in the biomedical field.
In fact, BBT's research is driven by the goal of advancing medical therapies through the design and application of cutting-edge biomaterials. For example, this includes the development of biocompatible and bioactive materials for tissue engineering, regenerative medicine, and medical device and drug innovations. Considering the medical needs, by leveraging the latest advancements in nanotechnology, nanomedicine, 3D printing, and biomaterial design, BBT aims to create solutions that can heal, replace, or regenerate damaged tissues and organs.

One of the BBT's core strengths is undoubtedly its inter- and multi-disciplinary approach, bringing together experts in diverse related field, for example, biomedical engineering and pharmaceutical nanotechnology, in order to tackle complex challenges in medicine. The BBT collaborative environment fosters innovation in the development of personalized treatments, particularly for complex diseases. BBT's research spans a wide range of applications, from bone and cartilage regeneration

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to wound healing, as well as the development of smart nano-based systems to monitor and delivery drugs and genes to the unhealthy organs/tissues of interest, and even to 3D-printing of highly organised structures for regenerative medicine.

Key highlights from BBT's recent research include work in 3D-printing structures for regenerative medicine, a field that has the potential to significantly alter the landscape of transplantation and regenerative medicine. In addition, BBT's research in biomaterial coatings for implants has shown great promise which can in the future reduce rejection rates and enhancing long-term patient outcomes. And another major focus is on personalized healthcare, where BBT's development of biomaterials and technologies tailored to individual patients, such as targeted nanomedicines.

Overall, BBT at UMCG continues to push the boundaries of biomedical research, with the aim of improving lives through better, more efficient medical technologies in timely research areas, such as regenerative medicine and tissue engineering, smart biomaterials, biomaterials for drug delivery, wearable and implantable biomedical devices, biocompatible polymers and hydrogels, nanotechnology in biomedical applications, artificial organs and biohybrids, biomedical robotics and prosthetics, gene therapy and CRISPR technologies, as well as biomechanics and implant materials.

BBT's research achievements and beyond in 2024 reflect our commitment to creating real-world impact through transformative innovations in healthcare, which is expected to flourish, maturate, expand, and boost further the biomedical innovations in 2025.

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RESEARCH GROUPS 2

2.1 Bacterial Adaptivity

Group leader: Brandon W. Peterson

The Peterson group focuses on interactions between bacteria and their surroundings. In relation to biomaterials, it encompasses bacterial adhesion, surface properties, stress adaptation, antimicrobial resistance, and effectiveness of drug delivery targeting systems. Most Bacterial Associated Infections are linked to the virulence factor of biofilm growth. Our group also studies interactions between biofilms and their environments, including detachment and re-adhesion phenomenon. Understanding how bacteria interact with their environment is critical to developing new successful techniques to combat the severe threat of antimicrobial resistance.

2.2 Bioimaging and Bioanalysis

Group leader: Romana Schirhagl

Schirhagl's group uses diamond-based quantum sensing for biomedical applications. This technique allows nanoscale MRI measurements by optical means. More specifically, the group uses small diamond particles which allow us to translate magnetic signals into optical signals. In a biological environment, we are sensitive to free radicals. Thus, this method can be used to measure stress responses in cell for instance for fundamental research, diagnosis or drug testing.

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2.3 Biomaterial associated infections and Biocompatibility

Group leader: Jelmer Sjollema

Sjollema's group concentrates on the effects of a foreign body (e.g. an implant) on the local cellular host environment and the impact of a bacterial infection in the context of Biocompatibility. The group tries to develop both sophisticated animal and in vitro models to study the local cellular environment around foreign bodies. On one hand, we focus on intravital imaging in mice to quantify cellular influx around the implant. On the other hand, we develop a 3D-printed tissue mimic to study the spatial and temporal behavior of a co-culture of macrophages, fibroblasts, and bacteria around implanted particles.

2.4 Biomaterials-associated Infections

Group leader: Henny van der Mei

The mechanism of microbial adhesion either through aggregation with each other, adhesion to tissue or to a medical implant and in addition the adaptive response, are investigated. The adaptive response includes the production of an extracellular polymeric matrix that protects biofilm bacteria against environmental attacks, including antibiotics and the immune system. Also, the interaction between tissue cells, immune cells and bacteria is a topic we investigate on modified biomaterials. Main fields of research interest:

- Prevention of microbial adhesion on biomaterials by anti-adhesive coatings, antimicrobial coatings, surface topographies.
- Stimulate the immune system to attack microbial adhesion.
- Non-antibiotic strategies based on nanotechnology for infection-control.

2.5 Bioprinting and Biofabrication

Group leader: Monize C. Decarli

We aim to manufacture tissue-like constructs for tissue engineering purposes, which will ultimately act as implants. Likewise, we manufacture reliable 3D models for drug screening or investigation of tissue formation and pathologies development. Our main research areas are:

- Bioprinting using cutting-edge technologies
- 3D Printing devices for high-throughput production of 3D cell models (spheroids and organoids)
- Development of natural hydrogels, such as produced, extracted, or reused from plants and animals

Development of bioactive hydrogels to enhance functionality, employing proteins, peptides, and extracellular vesicles. Here, special attention is to humanized materials based on xeno-free components extracted from human fluids.

2.6 Biotribology and Regeneration

Group leader: Prashant Kumar Sharma

Our main research interests are:

- Salivary Lubrication: Hydration and lubrication enhancement in the oral cavity to help dry mouth patients.
- Ocular Lubrication: Hydration and lubrication enhancement at the eyelid-cornea or eyelid-contact lens interface to help patients of dry eye disease.
- Articular Lubrication: Enhancement of cartilage lubrication, stopping the progression of cartilage damage and its restoration to help early articular pain relief and postponement of arthroplasty.
- Coatings: Devising lubricant coatings e.g. for meniscus implants or cardiovascular and urinary catheters.

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2.7 Cell-biomaterial Interactions

Group leader: Theo van Kooten

Expertise on cell-material interactions in general. Current topics are macrophage-mediated polymer degradation, study of the foreign body response and interactions with infection, such as in the window-on-a-mouse implant model. This extends into fibrosis model studies, of which the lens epithelial cell response is an interesting example. For cell-material interaction studies the cell culture lab, confocal microscopy, histology, and a plate reader are the basic tools. Research is embedded in the research institutes MoHaD and PRECISION.

2.8 Materiobiology and Nanobiomaterials

Group leader: Patrick van Rijn

We aim to direct cellular behavior by means of material properties. In order to achieve this, a fundamental understanding needs to be created how cells respond to materials, in particular towards several parameters simultaneously. Parameters like stiffness, chemical composition (charge, polarity, non-covalent interactions, hydrophobicity, etc.), and topography are parameters known to drastically influence cellular behaviors. When the single parameters influence the behavior of cells then combined parameters do this as well and not necessarily in a predictive fashion. We study this using complex multiparameter interfaces and nanomaterials.

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2.9 Surgical Robotics

Group leader: Sarthak Misra

We develop novel techniques to reach challenging locations within the body. We design a range of flexible minimally invasive surgical instruments and microrobotic systems, and robotically control them using various clinical imaging modalities such as ultrasound, computed tomography and magnetic resonance images.
The Surgical Robotics Lab (SRL) is composed of an interdisciplinary team of engineers from diverse backgrounds (Mechanical, Electrical, Biomedical, Applied Physics, and Technical Medicine). We closely collaborate with our clinical partners at Radboud University Nijmegen Medical Center, and Medisch Spectrum Twente.
SRL is equipped with rapid prototyping facilities such as 3D printer and laser cutter, and also access to the department workshop. Further, we also have 3D ultrasound (research) systems and several navigation instruments.

2.10 Targeted Drug Delivery with Nanomedicine

Group leader: Inge Zuhorn

Many drugs are unstable in the human body causing quick loss of activity and the need for high dosing and repeated administration. Moreover, drugs can produce side effects, such as liver toxicity as commonly observed with a.o. chemotherapy. The encapsulation of drugs in nanoparticles (i.e., nanomedicine) may help to improve drug stability, and reduce side effects. The targeting of nanomedicine to diseased tissue without harming healthy tissue is considered the Holy Grail of drug delivery. We develop nanomedicine to treat brain diseases in order to enhance drug efficacy, reduce side effects and achieve optimal treatment outcome.

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2.11 Translational Bionanomicro Theragenerative Medicine

Group leader: Hélder Almeida Santos

We shape the future of multifunctional medicines through the combination of material science, biology, medicine, chemistry, 3D-printing, and nanotechnology by developing novel drug delivery platforms, including nanomedicines, to a broad range of clinical targets.

In our research, we focus on several lines of investigation:

- Synthesis and fabrication of tissue-mimicking hydrogels and scaffolds for regenerative purposes.
- Development of bio-inspired and responsive nanomedicines for controlled drug release.
- Microfluidic-assisted preparation of drug formulations.
- Microneedles to improve the therapeutic performance of medicines.
- 3D-prining of biomaterials for regenerative engineering and tissue engineering.

2.12 Translational Bionanomicro Theragenerative Medicine

Group leader: Mohammad-Ali Shahbazi

In our research, we focus on several lines of investigation:

- Tissue-mimicking hydrogels and scaffolds for regenerative purposes.
- Development of biomimetic nanomedicines for controlled drug release.
- Near-infrared responsive nanomaterials .
- Microneedles to improve the therapeutic performance of medicines.

Our research teams make the unique bridge between immunology, pharmaceutical nanotechnology and material science to build innovative drug delivery formulations.

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RESEARCH PROJECTS 3

At BBT, biomedical engineering research focuses on the advances that improve human health and health care in different fields. Each year our researchers apply for and receive funding from various research funding agencies across the world. Below we list out the projects that received funding and started with a starting date in 2024. The starting date is when both the UMCG and the funding agency agree that the Grant Agreement enters into force.

3.1 Projects/grants awarded to PIs with a starting date in 2024

#	Group Leader	Funding Body	Project Title	Funding Awarded
1	Almeida Santos, H.	HORIZON EIC Pathfinder Open 2023	Bottom-up manufacturing of artificial anti-tumor T cells	€ 678,808.75
2	Rijn, van P.	SNN-EFRO-Valorisatie-2023-Middelgroot	Circulaire plastics voor biomedisch onderzoek en diagnostiek	€ 367,500.50
3	Rijn, van P.	SNN-EFRO	BBubbleCaRD: Bioresorbable Bubbles for Controlled Release of Drugs	€ 349,275.16
4	Schirhagl, R.	Eric and Wendy Schmidt Fund for Strategic Innovation	Fluorescent Nanodiamonds (FNDs) as Biosensors in Bioreactors	€ 2,835,702.00
			Total funding for projects started during 2024	**€ 4,231,286.41**

3.2 Projects/grants awarded to PhDs/ Postdocs with a starting date in 2024

#	PhD/ Postdoc	Group Leader	Funding Body	Project Title	Funding Awarded
1	Maria Camilla Ciardulli	Almeida Santos, H.	HORIZON-MSCA-2023-PF-01	SAVETHEHEART: Microfluidics-assisted synthesis of Dapagliflozin-loaded liposomes for heart fibrosis: Development of a 3D bioprinted multicellular in vitro model	€ 207,624.32
2	Julien Sayed	Rijn, van P.	NWO	Let's move: 3D printing of contractible hydrogels as muscle tissue mimics	€ 50,000.03
3	Escobar-Chaves	Schirhagl, R.	Cock J.K. de Stichting	Quantum sensing of free radicals in Nonalcoholic fatty liver disease and the antioxidant effect of a natural extract as a therapeutic agent	€ 4,600.00
4	Adela Melcrova	Schirhagl, R.	NWO	BBT - NWOxs Adela Melcrova	€ 51,039.00
5	Yuewen Zhu	Shahbazi, M.	Cock J.K. de Stichting	Yolk-shell Nanoparticles Loaded with Immune Adjuvant for Multimodal Colon Cancer Therapy	€ 4,600.00
6	Ginevra Mariani	Zuhorn, I.S.	Cock J.K. de Stichting	Establishing of a model for efficient spheroid formation and nanogel penetration	€ 4,600.00
7	Jie Gao	Zuhorn, I.S.	Cock J.K. de Stichting	Targeted Drug Delivery with Nanomedicine/ Zuhorn group	€ 4,600.00
8	Mariana L. Estrada	Zuhorn, I.S.	Cock J.K. de Stichting	Esophagus-on-a-chip for biomaterials evaluation	€ 4,600.00
9	Meng Qiao	Zuhorn, I.S.	Cock J.K. de Stichting	Codelivery of siRNA and temozolomide for treatment of glioblastoma	€ 4,600.00
				Total funding for projects started during 2024	**€ 336,263.35**

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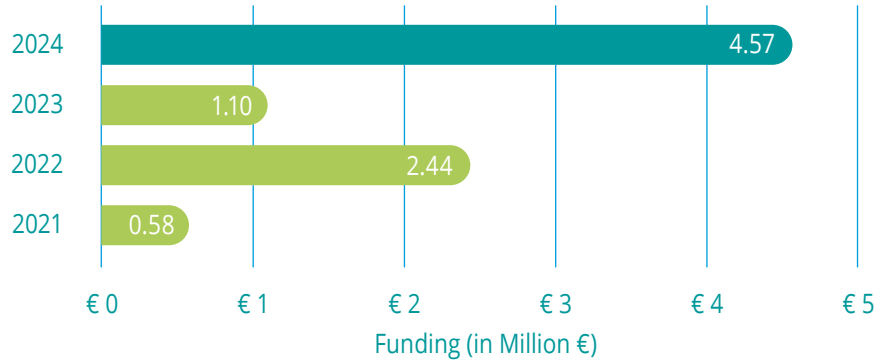
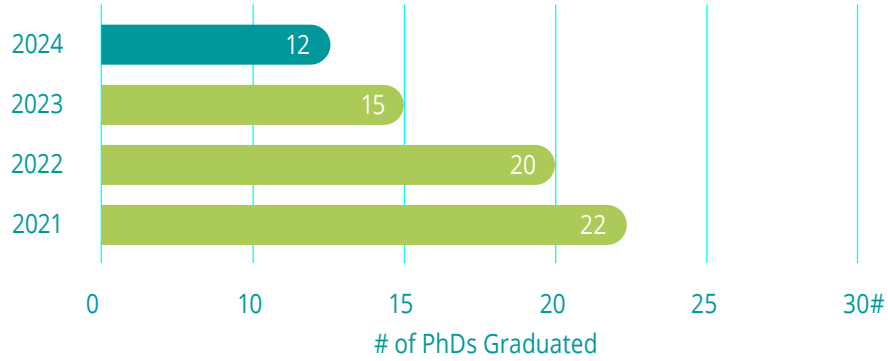
FACTS AND FIGURES 4

4.1 Funding of projects/grants started per year



* See Section:Research Projects for a list of projects started in 2024

4.2 PhD Graduations



* See Appendix for a list of all PhD theses defended in 2024

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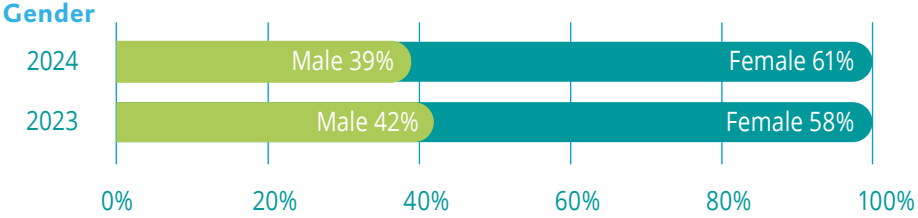
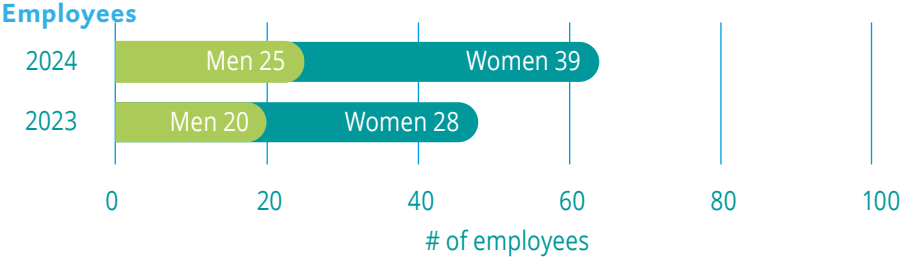
4.3 Personnel

Gender



Employees



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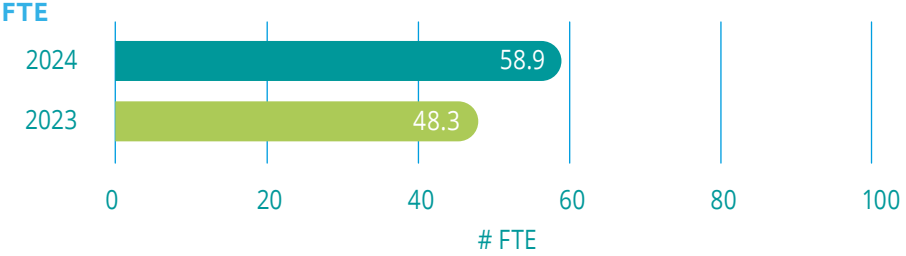

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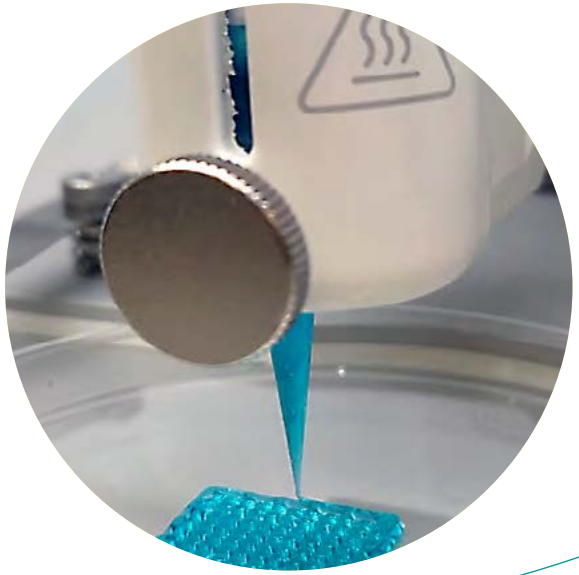
American	1
Brazilian	2
British	1
Chilean	2
Chinese	9
German	1
French	1
Irish	1
Indian	2
Iranian	4
Italian	5
Croatian	1
Mexican	1
Dutch	22
Austrian	1
Portuguese	4
Romanian	2
Spaniard	1
Czech	1
Turkish	2

Management team BBT	
Hélder Santos	Head of the Department
Marnix Labberte	Manager
Wytse Hogewerf	Manager
Henk Heidekamp	Cluster Director
Jesse Medema	Financial Controller
Ria Ubels	Quality Assurance Manager and Staff Advisor
Mallikarjuna Gurram	Project Manager and Grant support
Willy Koebrugge	Secretary

Technical Support Staff BBT
Ed de Jong
Gésinda Geertsema
Hans Kaper
Jelly Atema
Joop de Vries
Marja Slomp
Paulien Schaafsma
Stevie Sullivan
Willem Woudstra
Willy de Haan



EDUCATION 5

BBT is involved in the teaching of BSc and MSc students in multiple curricula, including Biology, Biomedical Sciences, Biomedical Engineering, and Molecular Medicine and Innovative Treatment (MMIT).

BBT members have roles as programme directors, course coordinators and lecturers. Dr. Jelmer Sjollema is the programme director of the Biomedical Engineering MSc (FSE). Prof. Inge Zuhorn is the programme director MMIT, a two-year selective MSc programme (FMS). In addition, BBT is involved in the HTRIC with prof. Santos as one of the scientific directors (2022–2024).

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Number of teaching hours by the BBT staff members

Faculty	Departments	BSc (in hrs)	MSc (in hrs)
Faculty of Medical Sciences (FMS)	Medicine	414.5	0
	MMIT	0	591.75
	GSMS	0	68
	Total	414.5	659.75
Faculty of Science and Engineering (FSE)	Biomedical Engineering	2774.8	2833.8
	Biomedical Sciences	0	16
	Biology	4	0
	Behavioural and Cognitive Neurosciences	0	52
	Total	2778.8	2901.8
Total number of hours:		**3193.3**	**3561.55**

Courses by the BBT staff members

BBT member	Course	Role
Faculty of Medical Sciences (FMS)		
Zuhon, I	MMIT	Education coordinator
Faculty of Science and Engineering (FSE)		
Van Kooten, TG	Anatomy and Physiology; WBBE024-05	Course coordinator
Van Kooten, TG	Cell Biology and Immunology; WBBE035-05	Course coordinator
Van Kooten, TG	Interface Biology; WMBE004-05	Course coordinator
Peterson, BW	Integrated Lab Course Biomaterials; WMBE003-05	Course coordinator
Peterson, BW	Biofilms; WMBE011-05	Course coordinator
Peterson, BW	Statistics 1 for BME; WBBE025-05	Course coordinator

BBT member	Course	Role
Peterson, BW	Statistical Methods for BME; WMBE021-05	Course coordinator
Van Rijn, P	Biomaterials 1; WBBE007-05	Course coordinator
Van Rijn, P	Biomaterials 2 (BME); WMBE001-05	Course coordinator
Van Rijn, P	Lab course Biomaterials WBBE036-05	Course coordinator
Schirhagl, R	Biomedical Instrumentation; WBBE003-05	Course coordinator
Schirhagl, R	Biomedical Instrumentation II; WMBE019-05	Course coordinator
Schirhagl, R	Surface Characterization; WMBE017-05	Course coordinator
Schirhagl, R	Microscopy and Imaging; WMBE006-05	Course coordinator
Schirhagl, R	Programme Committee Biomedical Engineering	Member
Schirhagl, R	Admission board MSc Biomedical Engineering	Member
Santos, H	Nanomedicines for Biomedical Applications; WMBE030-05	Course coordinator
Shahbazi, M	Recent Developments in Biomaterials; WMBE009-05	Course coordinator
Shahbazi, M	Research course BME; WBBE010-09	Course coordinator
Sjollema, J	Colloid andInterface Science; WMBE012-05	Course coordinator
Sjollema, J	Physicochemical Concepts in Bionanotechnology; WBBE044-05	Course coordinator
Sjollema, J	Master Biomedical Engineering	Program director
Peterson, BW	Microbiology; WBBE026-05	Course coordinator

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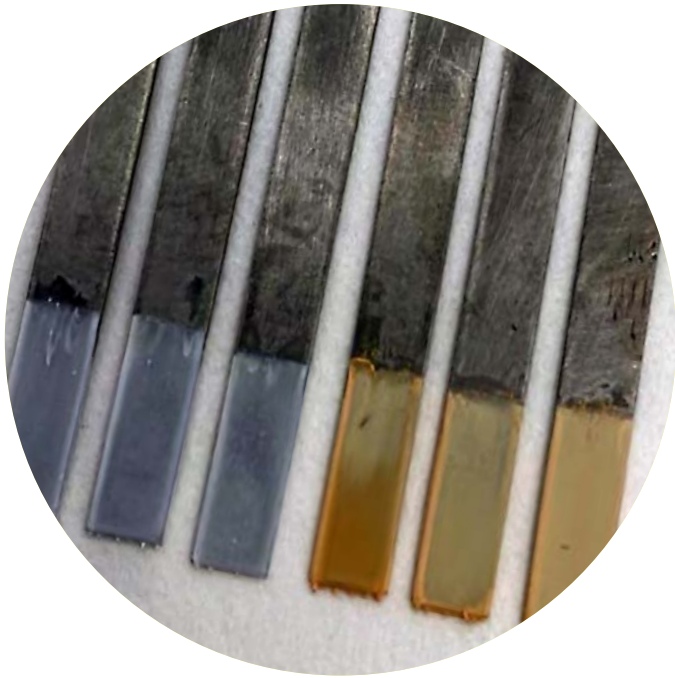
BBT member	Course	Role
Sharma, PK	Biofabrication; WBBE052-05	Course coordinator
Sharma, PK	Material Science; WBBE005-05	Course coordinator
Sharma, PK	Engineering and Biotribology; WMBE014-05	Course coordinator
Sharma, PK	Board of Examiners Engineering	Member
Van Kooten, TG	Board of Examiners Engineering	Member
Peterson, BW	Admission board MSc Biomedical Engineering	Member
Van Rijn, P	MSc Biomedical Engineering	Track coordinator



SCIENTIFIC DISSEMINATION AND BUSINESS DEVELOPMENT

6

At BBT, we encourage and support researchers to share our know-how, drive discoveries toward applications, and (in doing so) collaborate with industries. We welcome collaborations to generate access to our scientific ideas and state-of-the-art facilities. Below we list out results from our recent efforts to connect science with business.

6.1 QT Sense: Delivering nanodiamonds into tissues

In 2023, the foundation was laid for QTsense (https://www.qtsense.com/), a startup company (founded Feb 24) that emerged from Romana Schirhagl's group. The company commercializes equipment for performing quantum sensing equipment in living cells. Compared to the equipment in the research group, the commercial equipment is smaller, user-friendly and portable.

While diamond-based quantum sensing has been demonstrated in living cells earlier, measurements in tissues are still challenging. We have resolved several of the main hurdles towards measurements in living tissues. First, we have established how to deliver nanodiamond particles into tissues. Second, we have developed methods to perform quantum sensing measurements despite the large background fluorescence in tissues. Third, we have improved the loss of viability during the sample preparation and measuring process.

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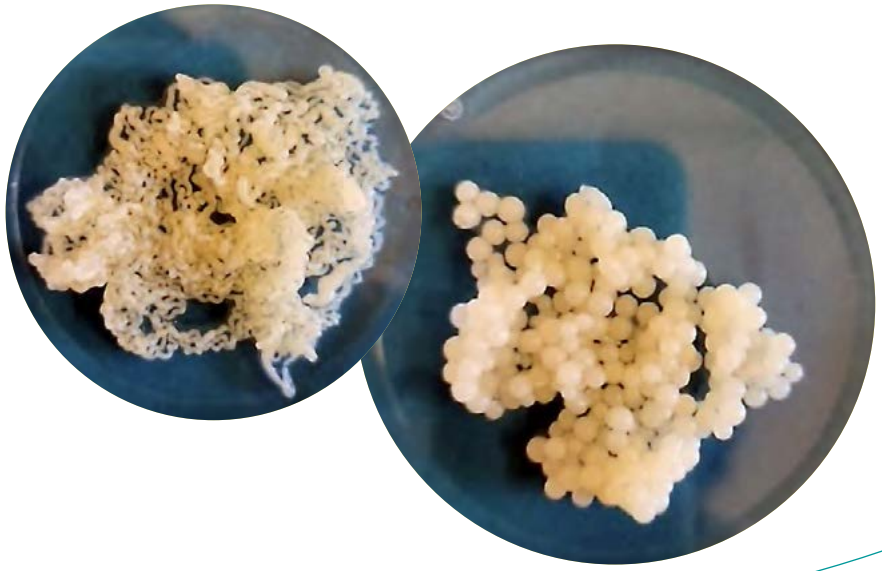
As a result, a patent has been submitted to protect the IP which is now licensed to QTsense:
S. Fan, A. Elias Llumbet, A. Sigaeva, Y. Zhang, M. Lobita, M.-A. Shahbazi, H. Santos, R. Schirhagl, Pending (2023)

6.2 MIT Catalyst

Dr. Decarli performed a training during 7 months at the Massachusetts Institute of Technology (Boston, United States) as a fellow in the prestigious Catalyst MIT Program. Prof. Hélder Santos also participated as Faculty Mentor in the program. The program focused on innovation and business development for emerging biomedical innovation leaders for the healthcare system.
More information is available at: https://catalyst.mit.edu/, https://catalyst.mit.edu/people/



OUTREACH ACTIVITIES 7

Besides research and education, all scientific staff members from BBT, including PhD students, postdocs, and group leaders, have been actively involved in the scientific outreach and dissemination activities. Below we list the notable activities by BBT during the last year. A fully documented list of achievements can be found on our Twitter account and our BBT news website:

- https://www.linkedin.com/company/department-of-biomaterials-and-biomedical-technology
- https://x.com/BBT_UMCG_RUG
- https://umcgresearch.org/w/news-overview-biomaterials-and-biomedical-technology

Examples of the outreach activities by the PIs, PhDs, Postdocs, and Technicians:

1. Dr. B.W. (Brandon) Peterson, Dr. M. (M.-Ali) Shahbazi, Testing the antibacterial efficacy of industrial products, Lidia Santiana Palha - master internship with Kuros Biosciences.
2. Dr. B.W. Peterson, Bacterial Adaptivity to Chemical Challenges, Eléonore Guisse - honors project 6 months
3. Prof. Santos Book Co-Editor: 'Technological Advances and Innovations in the Treatment of Chronic Respiratory Disorders' (1st Edition), 'Elsevier. 2024.
4. Prof. Santos listed as belonging to the World's Top 1% Scientists based on lifetime citation numbers: https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/7
5. Prof. Santos is an Honorable members of the Jury Committee for 'The Maurice-Marie Janot Honorary Award and Lecture, The Association Française des Enseignants de Pharmacie Galénique and The Association de Pharmacie Galénique Industrielle (APGI).
6. Prof. Santos was elected FWO Review College panels 2024 – 2026.

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7. Prof. Santos is IET A F Harvey Engineering Research Prize Panel Nominator member (2023–2025).
8. Prof. Santos was an Expert committee for the Research Centres Programme of Science Foundation Ireland (2023–2024)
9. Prof. Santos was selected as an Expert Panel Member for Publication Forum - Finland (2025–2028)
10. Prof. Santos Strategic Advisory Board of the School of Pharmacy and Pharmaceutical Sciences, Trinity College Dublin, Ireland
11. Prof. Santos was a Scientific Co-organizer of 'The next generation of nanomedicines: Formulation to precision therapies', Beilstein Nanotechnology Symposium 2024, 2-6 September 2024, Rüdesheim, Germany.
12. Prof. Santos again panel member of the European Research Council.
13. Prof. Hélder A. Santos inducted as New College of Fellow member for the Controlled Release Society (CRS), https://umcgresearch.org/w/prof.-helder-a.-santos-new-college-of-fellow-member-controlled-release-society
14. Prof. Hélder A. Santos: A diversity-oriented methodology to customize cardiac RNAi-based nanomedicines (BBT-News), https://umcgresearch.org/w/nature_comunication-article
15. Prof. Hélder A. Santos: Gabriela Corrêa Carvalho recieves two rewards, https://umcgresearch.org/w/gabriela-correa-carvalho-recieves-two-rewards
16. Prof. Hélder A. Santos: Identification of Splenic IRF7 as a Nanotherapy Target for Tele-Conditioning Myocardial Reperfusion Injury, https://umcgresearch.org/w/identification-of-splenic-irf7-as-a-nanotherapy-target-for-tele-conditioning-myocardial-reperfusion-injury
17. Prof. Hélder A. Santos: Maria Camilla Ciardulli, Marie Skłodowska-Curie Postdoctoral Fellow, https://umcgresearch.org/w/maria-camilla-ciardulli
18. Prof. Hélder A. Santos: Congratulating to our new Dr. (PhD), Gabriela Carvalho, who successfully defended Wednesday 17th of July her PhD thesis, https://umcgresearch.org/w/promotion_gabriela_carvalho
19. Prof. Hélder A. Santos: Winners of the 2024 Precision Collaboration Grants (BBT-news) https://umcgresearch.org/w/2024-precision-collaboration-grants

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20. Inge Zuhorn : Best poster award from Mariana Leal-Estrada during ENTEG day 2024
21. Inge Zuhorn presented the MSc programme MMIT at the Biomedical Interfaculty Congress (BIC)
22. Dr. Shahbazi joined the Chemical Engineering Journal as an editor, handling submitted studies in applied biomaterials and biotechnologies.
23. Dr. Shahbazi served as the reviewer of abstracts submitted to the Controlled Release Society 2024 Annual Meeting & Exposition, July 8 - July 12, 2024, Bologna, Italy.
24. Dr. Shahbazi served as a referee for grant proposals submitted to the European Science Foundation, Fonds de la Recherche Scientifique – FNRS (Belgium), and Swiss National Science Foundation (Switzerland).
25. Dr. Shahbazi was apointed a an honorary adjunct fellow at the Graduate School of Health, Faculty of Health, University of Technology Sydney, Sydney, Australia.
26. Dr. Shahbazi joined appointed as a member and secretary of the Skin and Mucosal Delivery Focus Group, Controlled Release Society (CRS).
27. Dr. Shahbazi gave a scientific lecture at the 2nd School of Supramolecular and Bio-Nanomaterials (2nd SBN School; https://sbn24.lakecomoschool.org/lecturers/) organized by Politecnico di Milano at Como Lake in Italy.
28. Dr. Shahbazi attended the Controlled Release Society 2024 Annual Meeting & Exposition, July 8 - July 12, 2024, Bologna, Italy.
29. Dr. Decarli was selected to be the organizer and chair of one theme symposium at the TERMIS EU conference to be held in 2025 - Freiberg. Title of the Symposium: Navigating New Seas: life as a Young PI in Tissue Engineering
30. Patrick van Rijn organised a strategic symposium with UNAM in Groningen as an interfaculty endeavor (https://umcgresearch.org/w/unam-symposium)
31. Patrick van Rijn participated as UMCG representative on Nanotechnology for knowledge safety at the ministery of OCW
32. Elkin Escobar Chaves was selected for the top 5 candidates (out of 120 applicants) for the prestigeous Seed Grants sponsored by Nano Letters for his work on using quantum sensing to determine the mechanism of obesity drugs. https://pubs.acs.org/doi/full/10.1021/acs.nanolett.4c03901

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33. Siyu Fan is one of the 4 finalists for the Agnes-Pockels-Promotionspreis 2025, https://www.bioanalysisgroup.com/post/siyu-is-one-of-the-4-finalists-for-the-agnes-pockels-promotionspreis-2025
34. Adela gave an interview about her work on antibiotic resistance, activity of membrane-active antimicrobials, and the use of physics in this field.
35. Adela's research on antibiotic resistance and how to treat it is in the news again. This time the Dutch magazine NewScientist covered the story.
36. David Aguirre Padilla is awarded the 'Best poster in basic Science' award at the XX World Congress of Stereotactic and Functional Neurosurgery held in Chicago, USA.
37. The RUG hosted an even where the top performers from each faculty were were invited to celebrate. Romana was one of the honored invitees.
38. Adela gave a interview about here research on fighting antibiotic resistance. You can read the article: https://www.wired.cz/clanky/jak-porazit-obavane-nemocnicni-superbakterie-ceska-biofyzicka-predstavuje-novou-cestu-jak-na-ne
39. Romana receives support from Schmidt Sciences for her work on quantum sensing in assessing the health of a bioreactor.
40. Romana's group has been successful in attracting funding by the de Cock Hadders foundation. Elkin Escobar Chaves's proposal has been awarded. In addition, Nuan Lin, our collaborator from Annemieke Hoeks group receives a grant for our collaborative project.
41. Adela Melcrova wins a Van Leeuvenhoek Award for the best publication of 2023 The award was given at the ceremony at the annual meeting of the Dutch Microbiology Society: https://www.scientificspringmeeting.nl/ The awarded paper can be found here: https://www.nature.com/articles/s41467-023-39726-5
42. Nuan receives a SHARE award for the best paper for her work with our group. You can read the article here: https://pubs.acs.org/doi/10.1021/acscentsci.3c00747
43. Sarthak Misra: Breakthrough in collaborative magnetic microrobotics https://www.utwente.nl/en/news/2023/10/1202472/breakthrough-in-collaborative-magnetic-microrobotics

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APPENDIX 1: GRADUATIONS

PhD graduations

More details about the PhD graduations can be found on the university research portal.

#	PhD Theses - BBT 2024	
1	PhD Student: Promotor(s): Co-promoter(s): Thesis title: URL:	Alejandro Reina Mahecha Prashant Sharma, Inge Zuhorn Theo van Kooten Cartilage Regeneration: A Scaffold-Free Tissue Engineering Approach Using 3D Printing https://research.rug.nl/en/publications/cartilage-regeneration-a-scaffold-free-tissue-engineering-approac
2	PhD Student: Promotor(s): Co-promoter(s): Thesis title: URL:	Chuang Li Sarthak Misra, Islam Khalil, S.M. - Advancements in Navigation of Untethered Small-Scale Helical Devices https://research.rug.nl/en/publications/advancements-in-navigation-of-untethered-small-scale-helical-devi
3	PhD Student: Promotor(s): Co-promoter(s): Thesis title: URL:	Clio Siebenmorgen Patrick van Rijn, Paul Jutte Martijn Verhagen Stimuli-responsive polymeric composites for advanced controllable biomaterials https://research.rug.nl/en/publications/stimuli-responsive-polymeric-composites-for-advanced-controllable

4	PhD Student:	Elías Llumbet, A.
	Promotor(s):	Romana Schirhagl, M. Manterola
	Co-promoter(s):	
	Thesis title:	Versatility of fluorescent nanodiamonds as free radical quantum sensors: from arthritis and metastasis to potential applications in heart diseases
	URL:	https://research.rug.nl/en/publications/versatility-of-fluorescent-nanodiamonds-as-free-radical-quantum-s
5	PhD Student:	Gabriela Corrêa Carvalho
	Promotor(s):	Hélder Almeida Santos, Marlus Chorilli, Tais Maria Bauab
	Co-promoter(s):	Brandon Peterson
	Thesis title:	Nano-in-nano containing curcumin and benzydamine hydrochloride for the treatment of vulvovaginal candidiasis: from development to biological application in vitro and in vivo
	URL:	https://research.rug.nl/en/publications/nano-in-nano-containing-curcumin-and-benzydamine-hydrochloride-fo
6	PhD Student:	Guang Yang
	Promotor(s):	Henny van der Mei, Henk Busscher, YijinRen
	Co-promoter(s):	-
	Thesis title:	Metabolic incorporation of ROS-generating cascade-reaction containers in bacterial cell walls for infection control
	URL:	https://research.rug.nl/en/publications/metabolic-incorporation-of-ros-generating-cascade-reaction-contai
7	PhD Student:	Guimei Jiang
	Promotor(s):	Henny van der Mei, Henk Busscher, Yijin Ren
	Co-promoter(s):	-
	Thesis title:	From Antibiotics to Nano-Antimicrobials, From Dendrimers to Megamers - How to Deal with Antibiotic-Resistance
	URL:	https://research.rug.nl/en/publications/from-antibiotics-to-nano-antimicrobials-from-dendrimers-to-megame

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8	PhD Student:	Huijie Han
	Promotor(s):	Hélder Almeida Santos, Inge Zuhorn
	Co-promoter(s):	Ali Shahbazi
	Thesis title:	Nano- and micro-delivery platforms for protein-based multimodal and synergetic breast cancer therapy
	URL:	https://research.rug.nl/en/publications/nano-and-micro-delivery-platforms-for-protein-based-multimodal-an
9	PhD Student:	Renfei Wu
	Promotor(s):	Henny van der Mei, Henk Busscher, Yijin Ren
	Co-promoter(s):	-
	Thesis title:	Metal-Organic-Framework-Based Nanocatalysts for Biofilm Dispersal and Immune Modulation
	URL:	https://research.rug.nl/en/publications/metal-organic-framework-based-nanocatalysts-for-biofilm-dispersal
10	PhD Student:	Torben van der Boon
	Promotor(s):	Patrick van Rijn, Ruud Bank
	Co-promoter(s):	-
	Thesis title:	On the Verge of Bio-instructive Medical Implant Surfaces: Gradient-based Screening Technology to Optimize Cell – Biomaterial Interactions
	URL:	https://research.rug.nl/en/publications/on-the-verge-of-bio-instructive-medical-implant-surfaces-gradient
11	PhD Student:	Yiyang Li
	Promotor(s):	Sarthak Misra, Ali Shahbazi
	Co-promoter(s):	-
	Thesis title:	Magnetic Localization Methods for Miniaturized Agents
	URL:	https://research.rug.nl/en/publications/magnetic-localization-methods-for-miniaturized-agents
12	PhD Student:	Zhengya Zhang
	Promotor(s):	Sarthak Misra, Islam Khalil, S.M.
	Co-promoter(s):	-
	Thesis title:	Control of Tetherless Magnetic Helical Devices Using A Synchronized Rotating Magnetic Actuation System
	URL:	https://research.rug.nl/en/publications/control-of-tetherless-magnetic-helical-devices-using-a-synchroniz

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MSc graduations

#	MSc Theses - 2024
1	MSc Student: Roos E.F. Martens Supervisor(s): Dr. B.W. Peterson (dentistry 2nd advisor) Thesis title: The in-vitro effect of SLS-free toothpastes on biofilms containing Streptococcus mutans, Streptococcus sobrinus and Candida albicans, compared to a SLS-containing dentifrice.
2	MSc Student: Eleni Anna Kostopoulou Supervisor(s): Patrick van Rijn, B.W. Peterson Thesis title: Smart and Sustainable Intra-Articular Injection for early stage oasteoarthritis
3	Master's Student: Alexa Dani (Master´s from University of Basel, External) Supervisor(s): Hélder Santos, Idaira Pacheco-Fernandéz, Maria Lobita Thesis title: Metal-organic framework nanoparticles loaded microneedles for macrophage polarization
4	Master's Student: Beatriz Braga (Master´s from University of Minho, External) Supervisor(s): Hélder Santos, Luigia Serpico Thesis title: Hyaluronic acid-modified selenium nanoparticles for cancer therapy
5	Student: Marta Ferreira (Master´s from University of Minho, External) Supervisor(s): Hélder Santos, Sebastian Lopez Thesis title: Lipid-based nanoparticles for annonacin delivery for glioblastoma application
6	Student: Beatriz Costa (Master´s from University of Minho, External) Supervisor(s): Hélder Santos, Raquel Bártolo Thesis title: Heart targeted lipid nanoparticles for 5-oxoprolinase upregulation in heart failure
7	Internship Student: Freek Burger (International Master in Innovative Medicine, IMIM program, UMCG) Supervisor(s): Hélder Santos, Maria Lobita Thesis title: Bacterial Extracellular Vesicles Loaded Dissolving Microneedles for Immunomodulation after Myocardial Infarction
8	Internship Student: Ivana Brenta (International Master in Innovative Medicine, IMIM program, UMCG) Supervisor(s): Hélder Santos, Clara Soeiro Thesis title: In vitro evalution of novel genipin-crosslinked hydrogels for bone tissue engineering

9	Internship Student: Iulia Dragan (Molecular Medicine and Innovative Treatment, MMIT program, UMCG) Supervisor(s): Hélder Santos, Idaira Pacheco-Fernandéz Thesis title:First steps towards a microextraction device for the diagnosis of non-alcoholic fatty liver disease: Tuning and evaluating metal organic frameworks
10	Internship student: Elena García (Molecular Medicine and Innovative Treatment, MMIT program, UMCG) Supervisor(s): Hélder Santos, Luigia Serpico Thesis title: Synthesis, characterisation, and in vitro compatibility of hyaluronic acid-covered selenium nanoparticles for melanoma therapy applications
11	Student: Paula Galvis (Bachelor´s from Universidad de Antioquia, External) Supervisor(s): Hélder Santos, Raquel Bártolo Thesis title: Biopolymer-based drug delivery nanosystems for parasporin transport and release at colon tumoral microenvironment
12	MSc Student: Rita Grimalt Supervisor(s): Inge Zuhorn, Dominik Paquet Thesis title: Investigating the role of endothelial nitric oxide synthase (NOS3) in vascular function via the generation and characterization of a NOS3 KO human induced pluripotent stem cell line
13	MSc Student: Nadine van der Linden Supervisor(s): Inge Zuhorn, Jose Maria Belen Ramos Thesis title: Regulators of Gene Expression as Biomarkers of Recent-Onset Psychosis in Peripheral Blood Mononuclear Cells
14	MSc Student: Dianeth Sara Lima Bejar Supervisor(s): Mohammad-Ali Shahbazi Thesis title: Study of the synthesis of photoactive nanomaterials for cancer therapy
15	MSc Student: Kik (Francoise) Marais Supervisor(s): Mohammad-Ali Shahbazi Thesis title: H2O2-genrating nanoparticle incorporated hydrogel for cancer therapy

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16	MSc Student: Adriana Vasi Supervisor(s): Prof. Sarthak Misra Thesis title: Ultrasound image-based tracking and motion control of magnetically-actuated soft small-scale robots
17	MSc Student: Guillem Budia Vendrell Supervisor(s): Prof. Sarthak Misra Thesis title: Preliminary design of a multimodal endomicroscopy probe

BSc graduations

#	BSc Theses - 2024
1	BSc Student: Evy van Harmelen Supervisor(s): Dr. Brandon Peterson, Dr. Prashant Sharma Thesis title: Loss of extracellular polymers of Staphylococcus aureus during bacterial harvesting techniques is consistent with their chemical removal
2	BSc Student: Valeria García González (Bachelor´s from Biomedical Engineering program, RUG) Supervisor(s): Hélder Santos, Raquel Bártolo Thesis title: Orthogonal design of experiments for assembling hybrid nanoparticles for sirna delivery post-myocardial infarction
3	BSc Student: Pietro Magaldi Supervisor(s): Inge Zuhorn, Laís Ribovski, Hélder Santos Thesis title: Monomer-Based Synthesis of Nanogels Using a Commercial Microfluidic System
4	BSc Student: Virun Malasena Supervisor(s): Inge Zuhorn, Ginevra Mariani, Pieter van der Zaag Thesis title: Characterisation of Microgels for Targeted Drug Delivery: A Comprehensive Analysis on their Physiochemical Properties

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5	BSc Student: Sander Smit Supervisor(s): Jelmer Sjollema Thesis title: Image and data analysis of marine and medical biofilm OCT images to determine correlations between tortuosity, contour, roughness and fractal dimension of the biofilm.
6	BSc Student: Khalil Akhundov Supervisor(s): Jelmer Sjollema Thesis title: Determining the cooling efficacy of intraluminal water in a smart gel equipped catheter
7	BSc Student: Anna Caterina van Grunsven Supervisor(s): Mohammad-Ali Shahbazi Thesis title: Tumor Microenvironment and Near-infrared Responsive Doxorubicin-Loaded Core-shell PDA@ MnO2-Cu Nanoparticles for Synergistically Enhanced Cancer Therapy
8	BSc Student: Rosalie van Vliet Supervisor(s): Patrick van Rijn, T.G. Van Kooten Thesis title: Mediated degradation of PHBHHx by macrophages and fibroblasts
9	BSc Student: Jippus J. Heydenrijk (Hanzehogeschool) Supervisor(s): Patrick van Rijn Thesis title: Vervangen van Polystyreen door circulair Polyhydroxyalkanoaat
10	BSc Student: Tjeerd van der Pas (Hogelschool van Hall Larenstein, Leeuwarden) Supervisor(s): Patrick van Rijn Thesis title: Delivery of light-switchable antibiotics using a Cyclodextrin-Based Drug Delivery System
11	BSc Student: Joep Hofstede Supervisor(s): E. van der Giessen, P K Sharma. Thesis title: Effect of impact energy on crack propagation in bovine cartilage
12	BSc Student: Andrei Bogdan Ioanitescu Supervisor(s): R J Renken, P K Sharma. Thesis title: Development of diffusion tensor imaging phantom for skeletal muscle characterization.
13	BSc Student: Dinh Thi Minh Khue Supervisor(s): P K Sharma, T G van Kooten. Thesis title: MODULATION OF GELMA PROPERTIES BY ADDING GELATIN AS NON-CROSSLINKING ADDITIVE

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14	BSc Student: Nizar Salman Supervisor(s): P K Sharma, T G van Kooten. Thesis title: Evaluation of a Pendulum-Type Device for Measuring Eyelid-Eye Friction Coefficient: A Comparative Study with Traditional Methods
15	BSc Student: Rhea Morar Supervisor(s): M Kamperman, P K Sharma. Thesis title: Preparation and characterization of a 3D printable ink from biopolymer complexation
16	BSc Student: Thomas Schutrups Supervisor(s): M Kamperman, P K Sharma. Thesis title: Friction and Rheology Analysis of a Thermoresponsive Coacervate Coating with Free N-isopropylacrylamide for Catheters
17	BSc Student: Wesley nieuwhof, Supervisor(s): Romana Schirhagl Thesis title: Diamond quantum sensing of foam cells to study disease progression
18	BSc Student: Thomas Mulder, Supervisor(s): Romana Schirhagl Thesis title: Fluorescent Nanodiamonds based Theranostic Platform for pH-Sensitive Drug Delivery and Quantum Sensing
19	BSc Student: Patricija Ozolina, Supervisor(s): Romana Schirhagl Thesis title: Exploring the Antioxidant Properties of OBE100 Extract and Assessing Nanodiamond Magnetometry in Tissue Analysis
20	BSc Student: Nicholas E. Roy Supervisor(s): Prof. Sarthak Misra Thesis title: Real-time GAN for spectral reconstruction images of fluorescent micro-agents
21	BSc Student: Sami Smayra Supervisor(s): T.G. van Kooten, A.M. Smink Thesis title: Development of a Manufacturing Process to Improve the Performance of PET Heart Valve Skirts
22	BSc Student: Ilse Verboom Supervisor(s): T.G. van Kooten, P. Van Rijn Thesis title: Effects of Human Macrophages on the Degradation of Poly(trimethylene Carbonate)

23	BSc Student: Jordan Cowley Supervisor(s): P. Van Rijn, T.G. Van Kooten Thesis title: Degradation of PHA under various (biological) aqueous environments
24	BSc Student: Javier Gonzales Supervisor(s): J. Sjollema, T.G. Van Kooten Thesis title: Fibroblasts embedded in a 3D-bioprinted GELMA construct
25	BSc Student: Adam Jones Supervisor(s): P. Van Rijn, T.G. Van Kooten Thesis title: Development of a Manufacturing Process to Improve the Performance of PET Heart Valve Skirts

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APPENDIX 2: PATENTS

1	European approval (27 January 2022) P113777EP10 Title: Novel biomaterial substrates, cell culture systems comprising the same and uses thereof in cell screening applications. Authors: Patrick van Rijn, et al.
2	USA approval (2023) US Appl No.16/488,397 Title: Novel biomaterial substrates, cell culture systems comprising the same and uses thereof in cell screening applications. Authors: Patrick van Rijn, et al.
3	Initial filing (19 January 2024) EP24152974.2 Title: Enhance cell-material interaction for ingrowth of ePTFE-sleeved cardiovascular stent based on physicochemical surface properties. Authors: Patrick van Rijn, et al.
4	Initial filing (24th June 2024) EP24184142.8 Title: Optimized properties of s silicone implant to prevent fibrosis Authors: Patrick van Rijn, et al.
5	Initial filing (2023), pending. Title: Delivering nanodiamonds into tissues, S. Fan, A. Elias Llumbet, A. Sigaeva, Y. Zhang, M. Lobita, M.-A. Shahbazi, H. Santos, R. Schirhagl. Application pending (2023). Authors: Romana Schirhagl, et al.
6	Dutch Provisional Patent N2034167 Magnetic field inductor C. M. Heunis, and S. Misra, 2023.
7	Dutch Provisional Patent N2033298 Continuum manipulator and system comprising such M. Richter, V. K. Venkiteswaran, and S. Misra, 2022.

APPENDIX 3: PUBLICATIONS

More details about these publications can be found on the university research portal.

	Brandon W. Peterson
1	Effects of sterilization on nanogel-based universal coatings: An essential step for clinical translation. Ghosh, D., Peterson, B. W., de Waal, C., de Vries, J., Kaper, H., Zu, G., Witjes, M., & van Rijn, P. (2024). Materials and Design, 238, Article 112689. https://doi.org/10.1016/j.matdes.2024.112689
2	Left ventricular shape index and eccentricity index with ECG-gated Nitrogen-13 ammonia PET/CT in patients with myocardial infarction, ischemia, and normal perfusion. Martínez-Lucio, T. S., Alexánderson-Rosas, E., Isabel Carvajal-Juárez, I., Mendoza-Ibáñez, A. K., Mendoza-Ibáñez, O. I., Monroy-Gonzalez, A. G., Peterson, B. W., Tsoumpas, C., & Slart, R. (2024). Journal of Nuclear Cardiology, 36, Article 101862. https://doi.org/10.1016/j.nuclcard.2024.101862
3	Nano-architectonics of Pt single-atoms and differently-sized nanoparticles supported by manganese-oxide nanosheets and impact on catalytic and anti-biofilm activities. Shi, Q., Yu, T., de Vries, J., Peterson, B. W., Ren, Y., Wu, R., Liu, J., Busscher, H. J., & van der Mei, H. C. (2024). Journal of Colloid and Interface Science, 672, 224-235. https://doi.org/10.1016/j.jcis.2024.05.241
4	The oral microbiota and periodontal health in orthodontic patients.Peterson, B. W., Tjakkes, GH., Renkema, AM., Manton, D. J., & Ren, Y. (2024). Periodontology 2000. Advance online publication. https://doi.org/10.1111/prd.12594

	Romana Schirhagl
1	Development of cholesterol imprinted polymer-based interfaces as smart sensors for detection of cholesterol in clinical samples. Hayat, H., Awan, F. R., Aziz, A., Schirhagl, R., Afzal, A., Mujahid, A., Jamil, A., Asim, T., Khan, W. S., & Bajwa, S. Z. (2024). Journal of materials research, 39(3), 459-470. https://doi.org/10.1557/s43578-023-01241-0
2	Diamond-based quantum sensing of free radicals in migrating human breast cancer cells. Reyes-San-Martin, C., Elías-Llumbet, A., Escobar-Chaves, E., Manterola, M., Mzyk, A., & Schirhagl, R. (2024). Carbon, 228, Article 119405. https://doi.org/10.1016/j.carbon.2024.119405

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3	Diamond Surfaces with Lateral Gradients for Systematic Optimization of Surface Chemistry for Relaxometry: a Low-Pressure Plasma-Based Approach. Tian, Y., Ortiz Moreno, A. R., Chipaux, M., Wu, K., Perona Martinez, F. P., Shirzad, H., Hamoh, T., Mzyk, A., van Rijn, P., & Schirhagl, R. (2024). Langmuir, 40(43), 23007-23017. https://doi.org/10.1021/acs.langmuir.4c03171
4	Dynamics for High-Sensitivity Detection of Free Radicals in Primary Bronchial Epithelial Cells upon Stimulation with Cigarette Smoke Extract. Zhang, Y., Sigaeva, A., Fan, S., Norouzi, N., Zheng, X., Heijink, I. H., Slebos, D. J., Pouwels, S. D., & Schirhagl, R. (2024). Nano Letters, 24(31), 9650-9657. https://doi.org/10.1021/acs.nanolett.4c02409
5	Free radical detection in precision-cut mouse liver slices with diamond-based quantum sensing. Zhang, Y., Sigaeva, A., Elías-Llumbet, A., Fan, S., Woudstra, W., de Boer, R., Escobar, E., Reyes-San-Martin, C., Kisabacak, R., Oosterhuis, D., Gorter, A. R., Coenen, B., Perona Martinez, F. P., van den Bogaart, G., Olinga, P., & Schirhagl, R. (2024).Proceedings of the National Academy of Sciences of the United States of America, 121(43), Article e2317921121. https://doi.org/10.1073/pnas.2317921121
6	In silico vaccine design: Targeting highly epitopic regions of Clostridium perfringens type D epsilon toxin and Clostridium novyi type B alpha toxin for optimal immunogenicity. Ashoori, N., Ranjbar, M. M., & Schirhagl, R. (2024). Computational and Structural Biotechnology Journal, 25, 153-164. https://doi.org/10.1016/j.csbj.2024.08.009
7	Melt electrowritten poly-lactic acid /nanodiamond scaffolds towards wound-healing patches. Wu, X., Li, W., Herlah, L., Koch, M., Wang, H., Schirhagl, R., & Włodarczyk-Biegun, M. K. (2024).Materials Today Bio, 26, Article 101112. https://doi.org/10.1016/j.mtbio.2024.101112
8	Microstructure-properties relation of hydrostatically extruded absorbable zinc alloys: Effect of Mg and Cu addition on corrosion properties and biocompatibility. Jarzębska, A., Gieleciak, M., Bigos, A., Maj, Ł., Trembecka-Wójciga, K., Bugajska, M., Bieda, M., Rogal, Ł., Kawałko, J., Przybysz, S., Wojtas, D., Mzyk, A., & Schirhagl, R. (2024). Journal of Materials Research and Technology, 30, 283-294. https://doi.org/10.1016/j.jmrt.2024.03.044
9	Quantum Sensing of Free Radical Generation in Mitochondria of Human Keratinocytes during UVB Exposure. Fan, S., Lopez Llorens, L., Perona Martinez, F. P., & Schirhagl, R. (2024). ACS Sensors, 9(5), 2440-2446. https://doi.org/10.1021/acssensors.4c00118
10	Quantum Sensing of Free Radical Generation in Mitochondria of Single Heart Muscle Cells during Hypoxia and Reoxygenation. Fan, S., Gao, H., Zhang, Y., Nie, L., Bártolo, R., Bron, R., Santos, H. A., & Schirhagl, R. (2024). Acs Nano, 18(4), 2982–2991. https://doi.org/10.1021/acsnano.3c07959

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11	Quantum Sensing Unravels Antioxidant Efficacy Within PCL/Matrigel Skin Equivalents. Wu, X., Koch, M., Martínez, F. P. P., Schirhagl, R., & Włodarczyk-Biegun, M. K. (2024). Small, 20(49), Article 2403729. https://doi.org/10.1002/smll.202403729
12	Solar-based aerator with water quality monitoring in vannamei shrimp pond. Pratama, I. P. E. W., Kusuma, F. A., Mujiyanti, S. F., Schirhagl, R., & Nanta, T. L. (2024). International Journal of Electrical and Computer Engineering, 14(5), 5048-5054. https://doi.org/10.11591/ijece.v14i5.pp5048-5054
13	The Interplay between Mechanoregulation and ROS in Heart Physiology, Disease, and Regeneration. Elias-Llumbet, A., Sharmin, R., Berg-Sorensen, K., Schirhagl, R., & Mzyk, A. (2024). Advanced healthcare materials, 13(23), Article 2400952. https://doi.org/10.1002/adhm.202400952
14	Timing and Mechanisms of Nanodiamond Uptake in Colon Cancer Cells. Sigaeva, A., Li, R., van Laar, J. J., Wierenga, L., & Schirhagl, R. (2024). Nanotechnology, Science and Applications, 17, 147-166. https://doi.org/10.2147/NSA.S464075
15	Towards using fluorescent nanodiamonds for studying cell migration. Reyes-San-Martin, C., Elías-Llumbet, A., Hamoh, T., Sharmin, R., Zhang, Y., Hermann, A., Woudstra, W., Mzyk, A., & Schirhagl, R. (2024). Cancer Nanotechnology, 15, Article 44. https://doi.org/10.1186/s12645-024-00277-z
16	Two-Dimensional MoS2-Based Photodetectors. Ye, L., Gan, X., & Schirhagl, R. (2024). Sustainability, 16(22), Article 10137. https://doi.org/10.3390/su162210137
17	Verifying the cytotoxicity of a biodegradable zinc alloy with nanodiamond sensors. Wojtas, D., Mzyk, A., Li, R., Zehetbauer, M., Schafler, E., Jarzębska, A., Sułkowski, B., & Schirhagl, R. (2024). Biomaterials Advances, 162, Article 213927. https://doi.org/10.1016/j.bioadv.2024.213927
18	What is the impact of plastic deformation on cytocompatibility of biodegradable Zn-Mg alloys? Wojtas, D., Trembecka-Wójciga, K., Gieleciak, M., Bigos, A., Brudecki, K., Przybysz-Gloc, S., Schirhagl, R., Mzyk, A., & Jarzębska, A. (2024). Materials Advances, 5(14), 5958-5973. https://doi.org/10.1039/d4ma00098f

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	Jelmer Sjollema
1	Bacterial killing and the dimensions of bacterial death. Wu, R., Li, C., Li, J., Sjollema, J., Geertsema-Doornbusch, G. I., de Haan-Visser, H. W., Dijkstra, E. S. C., Ren, Y., Zhang, Z., Liu, J., Flemming, H. C., Busscher, H. J., & van der Mei, H. C. (2024). NPJ biofilms and microbiomes, 10(1), Article 87. https://doi.org/10.1038/s41522-024-00559-9
2	Recent regulatory developments in EU Medical Device Regulation and their impact on biomaterials translation. Bioengineering and Translational Medicine. Jurczak, K. M., van der Boon, T. A. B., Devia-Rodriguez, R., Schuurmann, R. C. L., Sjollema, J., van Huizen, L., De Vries, J. P. P. M., & van Rijn, P. (2024). Advance online publication. https://doi.org/10.1002/btm2.10721
3	The use of biomimetic surfaces to reduce single- and dual-species biofilms of Escherichia coli and Pseudomonas putida. Teixeira-Santos, R., Azevedo, A., Romeu, M. J., Amador, C. I., Gomes, L. C., Whitehead, K. A., Sjollema, J., Burmølle, M., & Mergulhão, F. J. (2024). Biofilm, 7, Article 100185. https://doi.org/10.1016/j.bioflm.2024.100185
4	Understanding the flow behavior around marine biofilms. Romeu, M. J., Miranda, J. M., de Jong, E. D., Morais, J., Vasconcelos, V., Sjollema, J., & Mergulhão, F. J. (2024). Biofilm, 7, Article 100204. https://doi.org/10.1016/j.bioflm.2024.100204

	Henny van der Mei
1	A normalized parameter for comparison of biofilm dispersants in vitro. Tian, S., Shi, L., Ren, Y., van der Mei, H. C., & Busscher, H. J. (2024). Biofilm, 7, Article 100188. https://doi.org/10.1016/j.bioflm.2024.100188
2	Bacterial killing and the dimensions of bacterial death. Wu, R., Li, C., Li, J., Sjollema, J., Geertsema-Doornbusch, G. I., de Haan-Visser, H. W., Dijkstra, E. S. C., Ren, Y., Zhang, Z., Liu, J., Flemming, H. C., Busscher, H. J., & van der Mei, H. C. (2024). NPJ biofilms and microbiomes, 10(1), Article 87. https://doi.org/10.1038/s41522-024-00559-9
3	Beyond surface modification strategies to control infections associated with implanted biomaterials and devices - Addressing the opportunities offered by nanotechnology. Wang, D. Y., Su, L., Poelstra, K., Grainger, D. W., van der Mei, H. C., Shi, L., & Busscher, H. J. (2024). Biomaterials, 308, Article 122576. https://doi.org/10.1016/j.biomaterials.2024.122576

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4	Cetyltrimethylammonium-chloride assisted in situ metabolic incorporation of nano-sized ROS-generating cascade-reaction containers in Gram-positive and Gram-negative peptidoglycan layers for the control of bacterially-induced sepsis. Yang, G., Wang, D. Y., Song, J., Ren, Y., An, Y., Busscher, H. J., van der Mei, H. C., & Shi, L. (2024). Acta Biomaterialia, 181, 347-361. https://doi.org/10.1016/j.actbio.2024.04.045
5	Ciprofloxacin-Loaded, pH-Responsive PAMAM-Megamers Functionalized with S-Nitrosylated Hyaluronic Acid Support Infected Wound Healing in Mice without Inducing Antibiotic Resistance. Jiang, G., Wu, R., Liu, S., Yu, T., Ren, Y., Busscher, H. J., van der Mei, H. C., & Liu, J. (2024). Advanced healthcare materials, 13(3), Article 2301747. https://doi.org/10.1002/adhm.202301747
6	Corrigendum to 'PAMAM dendrimers with dual-conjugated vancomycin and Ag-nanoparticles do not induce bacterial resistance and kill vancomycin-resistant Staphylococci' (Acta Biomaterialia (2021) 124 (382–397), (S1742706121000593), (10.1016/j.actbio.2021.01.032)). Jiang, G., Liu, S., Yu, T., Wu, R., Ren, Y., van der Mei, H. C., Liu, J., & Busscher, H. J. (2024). Acta Biomaterialia, 184, 477-478. https://doi.org/10.1016/j.actbio.2024.06.044
7	Ellagic acid-modified gold nanoparticles to combat multi-drug resistant bacterial infections in vitro and in vivo. Wang, Y., Wu, F., Li, Y., Wang, S., Ren, Y., Shi, L., van der Mei, H. C., & Liu, Y. (2024). Materials Horizons, 11(19), 4781-4790. https://doi.org/10.1039/d4mh00642a
8	Lethal puncturing of planktonic Gram-positive and Gram-negative bacteria by magnetically-rotated silica hexapods. Quan, K., Qin, Y., Chen, K., Liu, M., Zhang, X., Liu, P., van der Mei, H. C., Busscher, H. J., & Zhang, Z. (2024). Journal of Colloid and Interface Science, 664, 275-283. https://doi.org/10.1016/j.jcis.2024.03.016
9	Macrophage Membrane-Coated, Nanostructured Adsorbent Surfaces in a microfluidic Device for Extracorporeal Blood Cleansing in Bacterially Induced Sepsis. Liu, S., van Beuningen, F., Xiao, X., Yu, L., zhao, J., Shi, R., Ren, Y., Bouma, H., van der Mei, H. C., Liu, J., & Busscher, H. (2024). Advanced Functional Materials, 34(2), Article 2305913. https://doi.org/10.1002/adfm.202305913
10	Maintaining Sidedness and Fluidity in Cell Membrane Coatings Supported on Nano-Particulate and Planar Surfaces. Liu, S., Li, Y., Shi, L., Liu, J., Ren, Y., Laman, J. D., van der Mei, H. C., & Busscher, H. J. (2024). Bioactive Materials, 32, 344-355. https://doi.org/10.1016/j.bioactmat.2023.10.010
11	Nano-architectonics of Pt single-atoms and differently-sized nanoparticles supported by manganese-oxide nanosheets and impact on catalytic and anti-biofilm activities. Shi, Q., Yu, T., de Vries, J., Peterson, B. W., Ren, Y., Wu, R., Liu, J., Busscher, H. J., & van der Mei, H. C. (2024). Journal of Colloid and Interface Science, 672, 224-235. https://doi.org/10.1016/j.jcis.2024.05.241

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	Monize Caiado Decarli
1	Leveraging Blood Components for 3D Printing Applications Through Programmable Ink Engineering Approaches. Sobreiro-Almeida, R., Santos, S. C., Decarli, M. C., Costa, M., Correia, T. R., Babilotte, J., Custódio, C. A., Moroni, L., & Mano, J. F. (2024). Advanced science, 11(47), Article 2406569. https://doi.org/10.1002/advs.202406569
2	Embedding bioprinting of low viscous, photopolymerizable blood-based bioinks in a crystal self-healing transparent supporting bath. Decarli, M.C.; Ferreira, H., Sobreiro-Almeida, R., Teixeira, F.C., Babillote, J., Olijve, O., Custódio, C., Gonçalves, I., Mota, C., Mano, J., Moroni, L. (2024). Small Methods. Article 2400857. https://doi: 10.1002/smtd.202400857

	Prashant Kumar Sharma
1	Effects of natural antimicrobial compounds propolis and copaiba on periodontal ligament fibroblasts, molecular docking, and in vivo study in Galleria mellonella. Pedrinha, V. F., Santos, L. M., Gonçalves, C. P., Garcia, M. T., Lameira, O. A., Queiroga, C. L., Marcucci, M. C., Shahbazi, M. A., Sharma, P. K., Junqueira, J. C., Sipert, C. R., & de Andrade, F. B. (2024). Biomedicine and Pharmacotherapy, 171, Article 116139. https://doi.org/10.1016/j.biopha.2024.116139
2	Fibroblast alignment and matrix remodeling induced by a stiffness gradient in a skin-derived extracellular matrix hydrogel. Zhao, F., Zhang, M., Nizamoglu, M., Kaper, H., Brouwer, L. A., Borghuis, T., Burgess, J. K., Harmsen, M. C., & Sharma, P. K. (2024). Acta Biomaterialia, 182, 67-80. https://doi.org/10.1016/j.actbio.2024.05.018

	Theo van Kooten
1	Beyond Encapsulation: Exploring Macrophage-Fibroblast Cross Talk in Implant-Induced Fibrosis. Sudarsanam, P. K., Alsema, E. C., Beijer, N. R. M., Kooten, T. V., & Boer, J. D. (2024). Tissue Engineering - Part B: Reviews, 30(6), 596-606. https://doi.org/10.1089/ten.teb.2023.0300
2	Double-Orthogonal Gradient-Based High-Throughput Screening Platform for Studying Cell Response Toward Combined Physicochemical Biomaterial Properties.van der Boon, T. A. B., Tromp, L. E., Ge, L., Yang, L., Guimaraes, C. F., Kühn, P. T., Zhou, Q., Bank, R. A., van Kooten, T. G., & van Rijn, P. (2024). Small Science, 4(1), Article 2300172. https://doi.org/10.1002/smsc.202300172

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	Patrick van Rijn
1	Diamond Surfaces with Lateral Gradients for Systematic Optimization of Surface Chemistry for Relaxometry: a Low-Pressure Plasma-Based Approach.Tian, Y., Ortiz Moreno, A. R., Chipaux, M., Wu, K., Perona Martinez, F. P., Shirzad, H., Hamoh, T., Mzyk, A., van Rijn, P., & Schirhagl, R. (2024). Langmuir, 40(43), 23007-23017. https://doi.org/10.1021/acs.langmuir.4c03171
2	Double-Orthogonal Gradient-Based High-Throughput Screening Platform for Studying Cell Response Toward Combined Physicochemical Biomaterial Properties. van der Boon, T. A. B., Tromp, L. E., Ge, L., Yang, L., Guimaraes, C. F., Kühn, P. T., Zhou, Q., Bank, R. A., van Kooten, T. G., & van Rijn, P. (2024). Small Science, 4(1), Article 2300172. https://doi.org/10.1002/smsc.202300172
3	Effects of sterilization on nanogel-based universal coatings: An essential step for clinical translation. Ghosh, D., Peterson, B. W., de Waal, C., de Vries, J., Kaper, H., Zu, G., Witjes, M., & van Rijn, P. (2024). Effects of sterilization on nanogel-based universal coatings: An essential step for clinical translation. Materials and Design, 238, Article 112689. https://doi.org/10.1016/j.matdes.2024.112689
4	Layered Double Hydroxides: Recent Progress and Promising Perspectives Toward Biomedical Applications. Li, L., Soyhan, I., Warszawik, E., & van Rijn, P. (2024). Advanced science , 11(20), Article e2306035. https://doi.org/10.1002/advs.202306035
5	Minimally designed thermo-magnetic dual responsive soft robots for complex applications. Siebenmorgen, C., Wang, C., Navarro, L. B., Parisi, D., Misra, S., Venkiteswaran, V. K., & van Rijn, P. (2024). Journal of materials chemistry b, 12, 5339-5349. https://doi.org/10.1039/d3tb02839a
6	Modulation of Biomaterial-Associated Fibrosis by Means of Combined Physicochemical Material Properties. Tromp, L. E., van der Boon, T. A. B., de Hilster, R. H. J., Bank, R., & van Rijn, P. (2024). Advanced science. Advance online publication. https://doi.org/10.1002/advs.202407531
7	Recent regulatory developments in EU Medical Device Regulation and their impact on biomaterials translation. Bioengineering and Translational Medicine. Jurczak, K. M., van der Boon, T. A. B., Devia-Rodriguez, R., Schuurmann, R. C. L., Sjollema, J., van Huizen, L., De Vries, J. P. P. M., & van Rijn, P. (2024). Advance online publication. https://doi.org/10.1002/btm2.10721
8	The unfolded protein response sensor PERK mediates mechanical stress-induced maturation of focal adhesion complexes in glioblastoma cells. Khoonkari, M., Liang, D., Kamperman, M., van Rijn, P., & Kruyt, F. A. E. (2024). FEBS Letters, 598(24), 3021-3035. https://doi.org/10.1002/1873-3468.14996

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	Sarthak Misra
1	Acoustically Actuated Flow in Microrobots Powered by Axisymmetric Resonant Bubbles. Mohanty, S., Lin, Y. H., Paul, A., van den Broek, M. R. P., Segers, T., & Misra, S. (2024). Advanced Intelligent Systems, 6(1), Article 2300465. https://doi.org/10.1002/aisy.202300465
2	A Magnetically Actuated Variable Stiffness Manipulator Based on Deployable Shape Memory Polymer Springs. Thomas, T. L., Bos, J., Huaroto, J. J., Kalpathy Venkiteswaran, V., & Misra, S. (2024). Advanced Intelligent Systems, 6(2), Article 2200465. https://doi.org/10.1002/aisy.202200465
3	APOLLO: advanced magnetic probes for minimally invasive endovascular interventions. Richter, M., Venkiteswaran, V. K., de Vries, J. P., & Misra, S. (2024). European Heart Journal, 45(29), 2589-2591. https://doi.org/10.1093/eurheartj/ehae155
4	Experimental Evaluation of Haptic Shared Control for Multiple Electromagnetic Untethered Microrobots. Ferro, M., Basualdo, F. N. P., Giordano, P. R., Misra, S., & Pacchierotti, C. (2024). IEEE Transactions on Automation Science and Engineering. Advance online publication. https://doi.org/10.1109/TASE.2024.3477308
5	Fin-Wave-Inspired Wireless Small-Scale Soft Robot for Adaptive Amphibious Locomotion Under Single-Mode Magnetic Field. Wang, C., Misra, S., & Venkiteswaran, V. K. (2024). In 2024 International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS) Institute of Electrical and Electronics Engineers Inc.. https://doi.org/10.1109/MARSS61851.2024.10612739
6	Fluidic control programming for 3D magnetic soft metamaterials with reconfigurable mechanical behaviors. Wang, Z., Misra, S., & Venkiteswaran, V. K. (2024). Cell Reports Physical Science, 5(8), Article 102125. https://doi.org/10.1016/j.xcrp.2024.102125
7	Graph Neural Network-Based Real-Time 3D Tracking for Micro-Agent Control. Jin, Y., Basualdo, F. P., Marino, A., Mei, Y., Giordano, P. R., Pacchierotti, C., & Misra, S. (2024). In S. Haliyo, M. Boudaoud, M. Mastrangeli, P. Lambert, & S. Fatikow (Eds.), Proceedings of MARSS 2024 - 7th International Conference on Manipulation, Automation, and Robotics at Small Scales (Proceedings of MARSS 2024 - 7th International Conference on Manipulation, Automation, and Robotics at Small Scales). Institute of Electrical and Electronics Engineers Inc.. https://doi.org/10.1109/MARSS61851.2024.10612750
8	Magnetic actuation of flexible and soft robotic systems for medical applications. Venkiteswaran, V. K., & Misra, S. (2024). In Recent Progress in Medical Miniature Robots: From Bench to Bedside (pp. 323-364). Elsevier. https://doi.org/10.1016/B978-0-443-13385-5.00012-X

9	Magnetic alginate microrobots with dual-motion patterns through centrifugally driven flow control. Wang, Z., Li, W., Li, C., Klingner, A., Pei, Y., Misra, S., & Khalil, I. S. M. (2024). Materials and Design, 246, Article 113337. https://doi.org/10.1016/j.matdes.2024.113337
10	Magnetic control of soft microrobots near step-out frequency: Characterization and analysis. Wang, Z., Li, W., Klingner, A., Pei, Y., Misra, S., & Khalil, I. S. M. (2024). Computational and Structural Biotechnology Journal, 25, 165-176. https://doi.org/10.1016/j.csbj.2024.08.022
11	Magnetic Nozzle-Free Embedded 3D (MagNoFE3D) Printing. Piñan Basualdo, F. N., Trikalitis, V. D., Visconti, S., Ficuciello, F., Goulas, C., Rouwkema, J., & Misra, S. (2024). Advanced Materials Technologies. Advance online publication. https://doi.org/10.1002/admt.202401097
12	Miniaturized Variable Stiffness Gripper Locally Actuated by Magnetic Fields. Masjosthusmann, L., Richter, M., Makushko, P., Makarov, D., & Misra, S. (2024). Advanced Intelligent Systems, Article 2400037. https://doi.org/10.1002/aisy.202400037
13	Minimally designed thermo-magnetic dual responsive soft robots for complex applications. Siebenmorgen, C., Wang, C., Navarro, L. B., Parisi, D., Misra, S., Venkiteswaran, V. K., & van Rijn, P. (2024). Journal of materials chemistry b, 12, 5339-5349. https://doi.org/10.1039/d3tb02839a
14	Multi-Sensing System Based on Fiber Bragg Grating Technology in Variable Stiffness Catheter for Temperature and Force Measurements. De Tommasi, F., Richter, M., D'Alvia, L., Carassiti, M., Palermo, E., Prete, Z. D., Schena, E., Misra, S., & Venkiteswaran, V. K. (2024). In 2024 IEEE International Symposium on Medical Measurements and Applications, MeMeA 2024 - Proceedings (2024 IEEE International Symposium on Medical Measurements and Applications, MeMeA 2024 - Proceedings). Institute of Electrical and Electronics Engineers Inc.. https://doi.org/10.1109/MeMeA60663.2024.10596768
15	Non-uniform magnetic fields for collective behavior of self-assembled magnetic pillars. Huaroto, J. J., Piñan Basualdo, F. N., Roos Ariëns, D. L., & Misra, S. (Accepted/In press). Swarm intelligence. https://doi.org/10.1007/s11721-024-00240-z
16	Selectively Tunable Joints With Variable Stiffness for a Magnetically-Steerable 6-DOF Manipulator. Frieler, S., Misra, S., & Kalpathy Venkiteswaran, V. (2024). IEEE Transactions on Medical Robotics and Bionics, 6(4), 1713-1725. https://doi.org/10.1109/TMRB.2024.3464668
17	Soft Bio-Microrobots: Toward Biomedical Applications. Wang, Z., Klingner, A., Magdanz, V., Misra, S., & S. M. Khalil, I. (2024). Advanced Intelligent Systems, 6(2), Article 2300093. https://doi.org/10.1002/aisy.202300093

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18	Temperature Assessment During Radio Frequency Ablation in Ex Vivo Long Bone by Fiber Bragg Grating Sensors. De Tommasi, F., Schena, E., Carassiti, M., Jutte, P., Venkiteswaran, V. K., & Misra, S. (2024). IEEE Sensors Journal, 24(4), 4542-4548. https://doi.org/10.1109/JSEN.2023.3347471
19	Towards Localization of Miniaturized Medical Robots With Microwaves. Lin, Y. H., Daguerre, H., Lavrenko, A., & Misra, S. (2024). IEEE Sensors Letters, 8(7), Article 3501604. https://doi.org/10.1109/LSENS.2024.3412400
20	Tunable Magnetic Trap: Using Passive Elements to Control Magnetic Microrobots. Basualdo, F. N. P., Van De Weerd, R., & Misra, S. (2024). IEEE Robotics and Automation Letters, 9(2), 1788-1794. https://doi.org/10.1109/LRA.2024.3349810
21	Untethered soft magnetic pump for microfluidics-based Marangoni surfer. Lin, Y. H., Piñan Basualdo, F. N., Kalpathy Venkiteswaran, V., & Misra, S. (2024). Scientific Reports, 14(1), Article 20280. https://doi.org/10.1038/s41598-024-70944-z

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1	Advanced porous materials for antimicrobial treatment. Miguel Sábio, R., Corrêa Carvalho, G., Li, J., Chorilli, M., & Santos, H. A. (2024). Nano Select, 5(7-8), Article 2300114. https://doi.org/10.1002/nano.202300114
2	Advances and challenges in hydrogel microspheres for biomedical applications.Lei, Y., Santos, H. A., & Cui, W. (2024). Biomaterials Translational, 5(3), 203-204. https://doi.org/10.12336/biomatertransl.2024.03.001
3	Advances in Microfluidic-Based Core@Shell Nanoparticles Fabrication for Cancer Applications. Almeida, D. R. S., Gil, J. F., Guillot, A. J., Li, J., Pinto, R. J. B., Santos, H. A., & Gonçalves, G. (2024). Advanced healthcare materials, 13(23), Article 2400946. https://doi.org/10.1002/adhm.202400946
4	Antifibrotic and Pro-regenerative Effects of SMAD3 siRNA and Collagen I mRNA-Loaded Lipid Nanoparticles in Human Tenocytes: ACS Applied Nano Materials. López-Cerdá, S., Molinaro, G., Tello, R. P., Correia, A., Waris, E., Hirvonen, J., Barreto, G., & Santos, H. A. (2024). ACS Applied Nano Materials, 7(15), 17736–17747. https://doi.org/10.1021/acsanm.4c02996

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5	A study of the oral bioavailability and biodistribution increase of Nanoencapsulation-driven Delivering radiolabeled anthocyanins. Katiane Osvaldt Rosales, T., Fernando Alves da Silva, F., Gonzàlez Rivera, A., Nascimento dos Santos, S., Bustos, D., Alberto Morales-Quintana, L., Santos, H. A., Soares Bernardes, E., & Paulo Fabi, J. (2024). Food Research International, 197, Part 1, Article 115125. https://doi.org/10.1016/j.foodres.2024.115125
6	A translational framework to DELIVER nanomedicines to the clinic. Joyce, P., Allen, C. J., Alonso, M. J., Ashford, M., Bradbury, M. S., Germain, M., Kavallaris, M., Langer, R., Lammers, T., Peracchia, M. T., Popat, A., Prestidge, C. A., Rijcken, C. J. F., Sarmento, B., Schmid, R. B., Schroeder, A., Subramaniam, S., Thorn, C. R., Whitehead, K. A., ... Santos, H. A. (2024). Nature Nanotechnology, 19, 1597–1611. https://doi.org/10.1038/s41565-024-01754-7
7	Bioengineered Nanomedicines Targeting the Intestinal Fc Receptor Achieve the Improved Glucoregulatory Effect of Semaglutide in a Type 2 Diabetic Mice Model. Pinto, S., Viegas, J., Cristelo, C., Pacheco, C., Barros, S., Buckley, S. T., Garousi, J., Gräslund, T., Santos, H. A., & Sarmento, B. (2024). Acs Nano. https://doi.org/10.1021/acsnano.4c11172
8	Biomimetic Platelet-Cloaked Nanoparticles for the Delivery of Anti-Inflammatory Curcumin in the Treatment of Atherosclerosis. Fontana, F., Molinaro, G., Moroni, S., Pallozzi, G., Ferreira, M. P. A., Tello, R. P., Elbadri, K., Torrieri, G., Correia, A., Kemell, M., Casettari, L., Celia, C., & Santos, H. A. (2024). Advanced healthcare materials, 13(15), Article 2302074. https://doi.org/10.1002/adhm.202302074
9	Breaking barriers: The potential of nanosystems in antituberculosis therapy. Carnero Canales, C. S., Marquez Cazorla, J. I., Marquez Cazorla, R. M., Roque-Borda, C. A., Polinário, G., Figueroa Banda, R. A., Sábio, R. M., Chorilli, M., Santos, H. A., & Pavan, F. R. (2024). Bioactive Materials, 39, 106-134. https://doi.org/10.1016/j.bioactmat.2024.05.013
10	Chapter 3.1 - Cell-based in vitro models for buccal permeability studies (2n Edition). Pinto, S., Shrestha, N., Araújo, F., Hirvonen, J., Santos, H. A., & Sarmento, B. (2024). In B. Sarmento, C. Leite Pereira, & J. D. Neves (Eds.), Concepts and Models for Drug Permeability Studies (Second Edition) (pp. 45-65). Woodhead Publishing. https://doi.org/10.1016/B978-0-443-15510-9.00004-9
11	Comparative optimization of polysaccharide-based nanoformulations for cardiac RNAi therapy. Gao, H., Li, S., Lan, Z., Pan, D., Naidu, G. S., Peer, D., Ye, C., Chen, H., Ma, M., Liu, Z., & Santos, H. A. (2024). Nature Communications, 15(1), Article 5398. https://doi.org/10.1038/s41467-024-49804-x
12	Curcuma Longa: Nutraceutical Use and Association With Nanotechnology. Corrêa Carvalho, G., Marena, G. D., Gaspar Gonçalves Fernandes, M., Ricci Leonardi, G., Santos, H. A., & Chorilli, M. (2024). Advanced healthcare materials, 13(22), Article 2400506. https://doi.org/10.1002/adhm.202400506

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13	Cyanocobalamin-loaded dissolving microneedles diminish skin inflammation in vivo. Guillot, A. J., Martínez-Navarrete, M., Giner, R. M., Recio, M. C., Santos, H. A., Cordeiro, A. S., & Melero, A. (2024). Journal of Controlled Release, 375, 537-551. https://doi.org/10.1016/j.jconrel.2024.09.032
14	Cyclosporin A-loaded dissolving microneedles for dermatitis therapy: Development, characterisation and efficacy in a delayed-type hypersensitivity in vivo model. Martínez-Navarrete, M., Guillot, A. J., Lobita, M. C., Recio, M. C., Giner, R., Aparicio-Blanco, J., Montesinos, M. C., Santos, H. A., & Melero, A. (2024). Drug Delivery and Translational Research, 14, 3404-3421. https://doi.org/10.1007/s13346-024-01542-9
15	Delivery and measurement of fluorescent nanocrystals in biological tissue.Sigaeva, A., Fan, S., Zhang, Y., Elías Llumbet, A., Dias Carmona Lobita, M. M., Shahbazi, M.-A., & Almeida Santos, H. (2024). (Patent No. WO2024253518).
16	Diatom-guided bone healing via a hybrid natural scaffold. Mohammadi, M., Abbaszadeh, S., Nosrati-Siahmazgi, V., Akbari, M., Rezaei, S., Musaie, K., Eskandari, M. R., Santos, H. A., Poursina, N., & Shahbazi, M.-A. (2024). Heliyon, 10(4), Article e25878. https://doi.org/10.1016/j.heliyon.2024.e25878
17	Electrochemical detection of atrial natriuretic peptide-coated nanocarriers based on a molecularly imprinted polymer receptor thin film. Silva, A. T., Bártolo, R., Santos, H. A., Pereira, C. M., & Ribeiro, J. A. (2024). Electrochimica Acta, 500, Article e144726. https://doi.org/10.1016/j.electacta.2024.144726
18	Engineering and Targeting Neutrophils for Cancer Therapy. Zhang, J., Gu, J., Wang, X., Ji, C., Yu, D., Wang, M., Pan, J., Santos, H. A., Zhang, H., & Zhang, X. (2024). Advanced materials, 36(19), Article 2310318. https://doi.org/10.1002/adma.202310318
19	Fabrication of Biomimetic Hybrid Liposomes via Microfluidic Technology: Homotypic Targeting and Antitumor Efficacy Studies in Glioma Cells. Arduino, I., Di Fonte, R., Sommonte, F., Lopedota, A. A., Porcelli, L., Li, J., Serrati, S., Bártolo, R., Santos, H. A., Iacobazzi, R. M., Azzariti, A., & Denora, N. (2024). International Journal of Nanomedicine, 19, 13217-13233. https://doi.org/10.2147/IJN.S489872
20	Front Cover: Nano Select 7–8 / 2024. Santos, H. A. (2024). Digital or Visual Products https://doi.org/10.1002/nano.202400909
21	Host-Directed Virus-Mimicking Particles Interacting with the ACE2 Receptor Competitively Block Coronavirus SARS-CoV-2 Entry.Zhang, P., Niemelä, E., López Cerdá, S., Sorvisto, P., Virtanen, J., & Santos, H. A. (2024). Nano Letters, 24(14), 4064–4071. https://doi.org/10.1021/acs.nanolett.3c04430

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22	Implantable Patch of Oxidized Nanofibrillated Cellulose and Lysozyme Amyloid Nanofibrils for the Regeneration of Infarcted Myocardium Tissue and Local Delivery of RNA-Loaded Nanoparticles. Carvalho, T., Bártolo, R., Correia, A., Vilela, C., Wang, S., Santos, H. A., & Freire, C. S. R. (2024). Macromolecular Rapid Communications, 45(15), Article 2400129. https://doi.org/10.1002/marc.202400129
23	Inside Back Cover: Nanoparticles Targeting the Intestinal Fc Receptor Enhance Intestinal Cellular Trafficking of Semaglutide.Santos, H. A. (2024). Digital or Visual Products https://doi.org/10.1016/S0168-3659(24)00121-4
24	In Situ Biofabrication of Microbial Cellulose Capsules Carrying Cubosomes: Toward Colon Targeted Multidrug Delivery. Ferreira, F. V., Ezazi, N. Z., Otoni, C. G., Aguiar, A. C., Bianchi, J. R. O., Lopes, J. H., dos Santos, D. M., Greca, L. G., Barud, H. S., Santos, H. A., Rojas, O. J., & Mattoso, L. H. C. (2024). ACS Applied Polymer Materials, 6(7), 3708 - 3720. https://doi.org/10.1021/acsapm.3c02851
25	Interplay of Nano-based Delivery Systems and Protein Signalling in Ameliorating Lung Diseases. Kulkarni, M. P., Paudel, K. R., Saeid, A. B., Rubis, G. D., Chellappan, D. K., Singh, M., Singh, S. K., Gupta, G., Shahbazi, M.-A., Oliver, B. G. G., Amiji, M. M., Santos, H. A., & Dua, K. (2024). Journal of drug delivery science and technology, 102(B), Article 106432. https://doi.org/10.1016/j.jddst.2024.106432
26	Lipid nanoparticles-based RNA therapies for breast cancer treatment. Serpico, L., Zhu, Y., Maia, R. F., Sumedha, S., Shahbazi, M.-A., & Santos, H. A. (2024). Drug Delivery and Translational Research, 14, 2823–2844. https://doi.org/10.1007/s13346-024-01638-2
27	Manganese@Albumin Nanocomplex and Its Assembled Nanowire Activate TLR4-Dependent Signaling Cascades of Macrophages. Huang, S., Gao, Y., Li, H., Wang, R., Zhang, X., Wang, X., Huang, D., Zhang, L., Santos, H. A., Yin, Z., & Xia, B. (2024). Advanced materials, 36(5), Article 2310979. https://doi.org/10.1002/adma.202310979
28	Nano- and Micro-Platforms in Therapeutic Proteins Delivery for Cancer Therapy: Materials and Strategies. Han, H., & Santos, H. A. (2024). Advanced materials, 36(45), Article 2409522. https://doi.org/10.1002/adma.202409522
29	Nanoparticles targeting the intestinal Fc receptor enhance intestinal cellular trafficking of semaglutide. Pinto, S., Hosseini, M., Buckley, S. T., Yin, W., Garousi, J., Gräslund, T., van Ijzendoorn, S., Santos, H. A., & Sarmento, B. (2024). Journal of Controlled Release, 366, 621-636. https://doi.org/10.1016/j.jconrel.2024.01.015

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30 Natural compounds-based nanomedicines for cancer treatment: Future directions and challenges. Andreani, T., Cheng, R., Elbadri, K., Ferro, C., Menezes, T., dos Santos, M. R., Pereira, C. M., & Santos, H. A. (2024). Drug Delivery and Translational Research, 14, 2845–2916. https://doi.org/10.1007/s13346-024-01649-z

31 New insights into nanomedicines for oral delivery of glucagon-like peptide-1 analogs. Pinto, S. F. T., Santos, H. A., & Sarmento, B. F. C. C. (2024). WIREs Nanomedicine and Nanobiotechnology, 16(2), Article e1952. https://doi.org/10.1002/wnan.1952

32 Next-generation chemotherapy treatments based on black hole algorithms: From cancer remission to chronic disease management. Santos, M. P. S. D., Bernardo, R. M. C., Vidal, J., Moreira, A., Torres, D. F. M., Herdeiro, C. A. R., Santos, H. A., & Gonçalves, G. (2024). Computers in biology and medicine, 180, Article 108961. https://doi.org/10.1016/j.compbiomed.2024.108961

33 Noninvasive Novel Transdermal Drug Delivery System for Deep Drug Permeability. Han, H., & Santos, H. A. (2024). Research, 7, Article 0504. https://doi.org/10.34133/research.0504

34 Physicochemical characterization of a lycopene-loaded mesoporous silica nanoparticle formulation. Carvalho, G. C., Marena, G. D., do Nascimento, A. L. C. S., de Camargo, B. A. F., Sábio, R. M., Lourenço, F. R., Santos, H. A., & Chorilli, M. (2024). Nano Select, 5(7-8), Article e2300131. https://doi.org/10.1002/nano.202300131

35 Polymeric Microspheres with High Mass Fraction of Therapeutics Enabled by the Manipulation of Kinetics Factor During Emulsion Droplet Solidification. Wei, Z., Zhu, M., Morin, N., Wollsten, D., Hirvonen, J., Yang, X., Santos, H. A., & Li, W. (2024). Advanced Functional Materials, Article 2417307. Advance online publication. https://doi.org/10.1002/adfm.202417307

36 Porous Si-Based Nanosystems for Immunotherapy Applications. Li, J., Carvalho, G. C., Chorilli, M., & Santos, H. A. (2024). In I. F. Uchegbu, A. G. Schätzlein, A. Lalatsa, & D. R. S. Lopez (Eds.), Fundamentals of Pharmaceutical Nanoscience (2 ed., pp. 165-181). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-59478-6_8

37 Porous Silicon Nanoparticles Conjugated Magnetite-Chitosan Graphene Oxide Nanoparticles for Effective Removal of Complex Pollutants. Qu, X., Zhang, H., Kong, H., Chen, D., Yang, Z., Mäkilä, E., Salonen, J., Santos, H. A., Hai, M., & Weitz, D. A. (2024). Advanced Sustainable Systems, 8(7), Article 2300471. https://doi.org/10.1002/adsu.202300471

38 Preface. De Rubis, G., MacLoughlin, R., Santos, H. A., Shetty, S., Suares, D., & Dua, K. (2024). In G. De Rubis, R. MacLoughlin, H. A. Santos, S. Shetty, D. Suares, & K. Dua (Eds.), Technological Advances and Innovations in the Treatment of Chronic Respiratory Disorders (pp. xxi-xxii). Elsevier. https://doi.org/10.1016/B978-0-443-27345-2.05001-3

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39	Quantitative analysis of electroporation-mediated intracellular delivery via bioorthogonal luminescent reaction. Wang, S., Shcherbii, M. V., Hirvonen, S.-P., Silvennoinen, G., Sarparanta, M., & Santos, H. A. (2024). Communications chemistry, 7(1), Article 181. https://doi.org/10.1038/s42004-024-01266-4
40	Quantum Sensing of Free Radical Generation in Mitochondria of Single Heart Muscle Cells during Hypoxia and Reoxygenation. Fan, S., Gao, H., Zhang, Y., Nie, L., Bártolo, R., Bron, R., Santos, H. A., & Schirhagl, R. (2024). Acs Nano, 18(4), 2982–2991. https://doi.org/10.1021/acsnano.3c07959
41	Revolutionizing lung health: Exploring the latest breakthroughs and future prospects of synbiotic nanostructures in lung diseases. Bani Saeid, A., De Rubis, G., Williams, K. A., Yeung, S., Chellappan, D. K., Singh, S. K., Gupta, G., Hansbro, P. M., Shahbazi, M.-A., Gulati, M., Kaur, I. P., Santos, H. A., Paudel, K. R., & Dua, K. (2024). Chemico-Biological interactions, 395, Article 111009. https://doi.org/10.1016/j.cbi.2024.111009
42	Selenium Nanoparticles Synergize with a KRAS Nanovaccine against Breast Cancer. Ferro, C., Matos, A. I., Serpico, L., Fontana, F., Chiaro, J., D'Amico, C., Correia, A., Koivula, R., Kemell, M., Gaspar, M. M., Acúrcio, R. C., Cerullo, V., Santos, H. A., & Florindo, H. F. (2024). Advanced healthcare materials, Article 2401523. Advance online publication. https://doi.org/10.1002/adhm.202401523
43	Self-Nanoformulating Poly(2-oxazoline) and Poly(2-oxazine) Copolymers Based Amorphous Solid Dispersions as Microneedle Patch: A Formulation Study. D'Amico, C., Ziegler, A.-L., Kemell, M., Molinaro, G., Luxenhofer, R., & Santos, H. A. (2024). Advanced Materials Technologies, 9(23), Article 2400766. https://doi.org/10.1002/admt.202400766
44	Special Issue on Advances in Porous Materials. Santos, H. A. (2024). Nano Select, 5(7-8), Article e202400088. https://doi.org/10.1002/nano.202400088
45	Study of the Synergistic Immunomodulatory and Antifibrotic Effects of Dual-Loaded Budesonide and Serpine1 siRNA Lipid-Polymer Nanoparticles Targeting Macrophage Dysregulation in Tendinopathy. López-Cerdá, S., Molinaro, G., Tello, R. P., Correia, A., Künig, S., Steinberger, P., Jeltsch, M., Hirvonen, J. T., Barreto, G., Stöckl, J., & Santos, H. A. (2024). ACS Applied Materials Interfaces, 16(15), 18643-18657. https://doi.org/10.1021/acsami.4c02363
46	Technological Advances and Innovations in the Treatment of Chronic Respiratory Disorders. De Rubis, G., MacLoughlin, R., Santos, H. A., Shetty, S., Suares, D., & Dua, K. (Eds.) (2024). Elsevier. https://doi.org/10.1016/C2023-0-50902-4
47	Unlocking the potential of nanomedicine: advances in precision targeting strategies. Celia, C., Teesalu, T., & Santos, H. A. (2024). Drug Delivery and Translational Research, 14, 2593–2597. https://doi.org/10.1007/s13346-024-01686-8

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	Mohammad-Ali Shahbazi
1	Anti-Nociceptive Effect of Sufentanil Polymeric Dissolving Microneedle on Male Mice by Hot Plate Technique. Pourmansouri, Z., Malekkhatabi, A., Toolabi, M., Akbari, M., Shahbazi, M. A., & Rostami, A. (2024). Iranian biomedical journal, 28(4), 192-205. https://pmc.ncbi.nlm.nih.gov/articles/PMC11444482/
2	Antioxidant, hemostatic, and injectable hydrogels with photothermal antibacterial activity to accelerate full-thickness wound regeneration. Alinezhad, V., Ghodsi, R., Bagheri, H., Beram, F. M., Zeighami, H., Kalantari-Hesari, A., Salarilak, L., Mostafavi, E., Ahmadian, Z., Shahbazi, M. A., & Maleki, A. (2024). New Journal of Chemistry, 48, 7761-7778. https://doi.org/10.1039/d3nj05871a
3	Assessing the structural stability and drug encapsulation efficiency of poly(ethylene glycol)-poly(L-lactic acid) nanoparticles loaded with atorvastatin calcium: Based on dissipative particle dynamics. Feng, Y. H., Guo, W. X., Li, Z. L., Hu, L. F., Liu, Y., Jing, L. Y., Wang, J., Shahbazi, M. A., Chen, B. Z., & Guo, X. D. (2024). International Journal of Biological Macromolecules, 267, Article 131436. https://doi.org/10.1016/j.ijbiomac.2024.131436
4	A thermoresponsive chitosan-based in situ gel formulation incorporated with 5-FU loaded nanoerythrosomes for fibrosarcoma local chemotherapy. Javadi, P., Derakhshan, M. A., Heidari, R., Ashrafi, H., Azarpira, N., Shahbazi, M. A., & Azadi, A. (2024). International Journal of Biological Macromolecules, 278, Article 134781. https://doi.org/10.1016/j.ijbiomac.2024.134781
5	Cell membrane coated nanoparticles: cutting-edge drug delivery systems for osteoporosis therapy. Liao, J., Lu, L., Chu, X., Xiong, Y., Zhou, W., Cao, F., Cheng, P., Shahbazi, M. A., Liu, G., & Mi, B. (2024). Nanoscale, 16(17), 8236-8255. https://doi.org/10.1039/d3nr06264c
6	Copper incorporated biomaterial-based technologies for multifunctional wound repair. Zhang, Z., Xue, H., Xiong, Y., Geng, Y., Panayi, A. C., Knoedler, S., Dai, G., Shahbazi, M. A., Mi, B., & Liu, G. (2024). Theranostics, 14(2), 547-570. https://doi.org/10.7150/thno.87193
7	Delivery and measurement of fluorescent nanocrystals in biological tissue. Sigaeva, A., Fan, S., Zhang, Y., Elías Llumbet, A., Dias Carmona Lobita, M. M., Shahbazi, M.-A., & Almeida Santos, H. (2024). (Patent No. WO2024253518).
8	Designing of a Multifunctional 3D-Printed Biomimetic Theragenerative Aerogel Scaffold via Mussel-Inspired Chemistry: Bioactive Glass Nanofiber-Incorporated Self-Assembled Silk Fibroin with Antibacterial, Antiosteosarcoma, and Osteoinductive Properties. Abie, N., Ünlü, C., Pinho, A. R., Gomes, M. C., Remmler, T., Herb, M., Grumme, D., Tabesh, E., Shahbazi, M. A., Mathur, S., Mano, J. F., & Maleki, H. (2024). ACS Applied Materials and Interfaces, 16(18), 22809–22827. https://doi.org/10.1021/acsami.4c00065

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9	Diatom-guided bone healing via a hybrid natural scaffold. Mohammadi, M., Abbaszadeh, S., Nosrati-Siahmazgi, V., Akbari, M., Rezaei, S., Musaie, K., Eskandari, M. R., Santos, H. A., Poursina, N., & Shahbazi, M.-A. (2024). Heliyon, 10(4), Article e25878. https://doi.org/10.1016/j.heliyon.2024.e25878
10	Dual-functional microneedle with programmatic regulation of macrophage for autoimmune psoriasis treatment. Zhao, Z. Q., Chen, B. Z., Gan, J. L., Feng, Y. H., Liang, L., Yu, L., Wang, Z. Y., Abbaszadeh, S., Shahbazi, M. A., Yu, R., & Guo, X. D. (2024). Nano Research, 17(8), 7436-7448. https://doi.org/10.1007/s12274-024-6711-5
11	Effects of natural antimicrobial compounds propolis and copaiba on periodontal ligament fibroblasts, molecular docking, and in vivo study in Galleria mellonella. Pedrinha, V. F., Santos, L. M., Gonçalves, C. P., Garcia, M. T., Lameira, O. A., Queiroga, C. L., Marcucci, M. C., Shahbazi, M. A., Sharma, P. K., Junqueira, J. C., Sipert, C. R., & de Andrade, F. B. (2024). Biomedicine and Pharmacotherapy, 171, Article 116139. https://doi.org/10.1016/j.biopha.2024.116139
12	Emerging 2D Nanomaterials-Integrated Hydrogels: Advancements in Designing Theragenerative Materials for Bone Regeneration and Disease Therapy. Zorrón, M., Cabrera, A. L., Sharma, R., Radhakrishnan, J., Abbaszadeh, S., Shahbazi, M. A., Tafreshi, O. A., Karamikamkar, S., & Maleki, H. (2024). Advanced science, 11(31), Article 2403204. https://doi.org/10.1002/advs.202403204
13	Extracellular Vesicles from Nanomedicine-Trained Intestinal Microbiota Substitute for Fecal Microbiota Transplant in Treating Ulcerative Colitis. Zu, M., Liu, G., Xu, H., Zhu, Z., Zhen, J., Li, B., Shi, X., Shahbazi, M. A., Reis, R. L., Kundu, S. C., Nie, G., & Xiao, B. (2024). Advanced materials, 36(41), Article 2409138. https://doi.org/10.1002/adma.202409138
14	Lipid nanoparticles-based RNA therapies for breast cancer treatment. Serpico, L., Zhu, Y., Maia, R. F., Sumedha, S., Shahbazi, M.-A., & Santos, H. A. (2024). Drug Delivery and Translational Research, 14, 2823–2844. https://doi.org/10.1007/s13346-024-01638-2
15	Machine learning-assisted rheumatoid arthritis formulations: A review on smart pharmaceutical design. Pouyanfar, N., Anvari, Z., Davarikia, K., Aftabi, P., Tajik, N., Shoara, Y., Ahmadi, M., Ayyoubzadeh, S. M., Shahbazi, M. A., & Ghorbani-Bidkorpeh, F. (2024). Materials today communications, 41, Article 110208. https://doi.org/10.1016/j.mtcomm.2024.110208
16	Magnetic natural lipid nanoparticles for oral treatment of colorectal cancer through potentiated antitumor immunity and microbiota metabolite regulation. Li, B., Zu, M., Jiang, A., Cao, Y., Wu, J., Shahbazi, M. A., Shi, X., Reis, R. L., Kundu, S. C., & Xiao, B. (2024). Biomaterials, 307, Article 122530. https://doi.org/10.1016/j.biomaterials.2024.122530

17	Microenvironment-responsive nanomedicines: a promising direction for tissue regeneration. Xiong, Y., Mi, B. B., Shahbazi, M. A., Xia, T., & Xiao, J. (2024). Military Medical Research, 11, Article 69. https://doi.org/10.1186/s40779-024-00573-0
18	Nanoarchitecture-Integrated Hydrogel Boosts Angiogenesis–Osteogenesis–Neurogenesis Tripling for Infected Bone Fracture Healing. Zha, K., Hu, W., Xiong, Y., Zhang, S., Tan, M., Bu, P., Zhao, Y., Zhang, W., Lin, Z., Hu, Y., Shahbazi, M. A., Feng, Q., Liu, G., & Mi, B. (2024). Advanced science, 11(43), Article 2406439. https://doi.org/10.1002/advs.202406439
19	Nano-Armed Limosilactobacillus reuteri for Enhanced Photo-Immunotherapy and Microbiota Tryptophan Metabolism against Colorectal Cancer. Xu, H., Wang, Y., Liu, G., Zhu, Z., Shahbazi, M. A., Reis, R. L., Kundu, S. C., Shi, X., Zu, M., & Xiao, B. (2024). Advanced science. Advance online publication. https://doi.org/10.1002/advs.202410011
20	Neddylation suppression by a macrophage membrane-coated nanoparticle promotes dual immunomodulatory repair of diabetic wounds. Zeng, R., Lv, B., Lin, Z., Chu, X., Xiong, Y., Knoedler, S., Cao, F., Lin, C., Chen, L., Yu, C., Liao, J., Zhou, W., Dai, G., Shahbazi, M. A., Mi, B., & Liu, G. (2024). Bioactive Materials, 34, 366-380. https://doi.org/10.1016/j.bioactmat.2023.12.025
21	NIR□Responsive injectable hydrogel cross-linked by homobifunctional PEG for photo-hyperthermia of melanoma, antibacterial wound healing, and preventing post-operative adhesion. Nosrati-Siahmazgi, V., Abbaszadeh, S., Musaie, K., Eskandari, M. R., Rezaei, S., Xiao, B., Ghorbani-Bidkorpeh, F., & Shahbazi, M. A. (2024). Materials Today Bio, 26, Article 101062. https://doi.org/10.1016/j.mtbio.2024.101062
22	Recent Biomaterial-Assisted Approaches for Immunotherapeutic Inhibition of Cancer Recurrence. Mozafari, N., Jahanbekam, S., Ashrafi, H., Shahbazi, M. A., & Azadi, A. (2024). ACS Biomaterials Science and Engineering, 10(3), 1207-1234. https://doi.org/10.1021/acsbiomaterials.3c01347
23	Revolutionizing lung health: Exploring the latest breakthroughs and future prospects of synbiotic nanostructures in lung diseases. Bani Saeid, A., De Rubis, G., Williams, K. A., Yeung, S., Chellappan, D. K., Singh, S. K., Gupta, G., Hansbro, P. M., Shahbazi, M.-A., Gulati, M., Kaur, I. P., Santos, H. A., Paudel, K. R., & Dua, K. (2024). Chemico-Biological interactions, 395, Article 111009. https://doi.org/10.1016/j.cbi.2024.111009
24	Staphopain mediated virulence and antibiotic resistance alteration in co-infection of Staphylococcus aureus and Pseudomonas aeruginosa: an animal model. Dehbashi, S., Tahmasebi, H., Alikhani, M. Y., Shahbazi, M. A., & Arabestani, M. R. (2024). BMC Biotechnology, 24, Article 10. https://doi.org/10.1186/s12896-024-00840-x

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25	Synthesis, modification, characterization, and in vitro evaluation of chitosan-hyaluronic acid coated MIL-100 (Fe) nanoparticles for methotrexate delivery in rheumatoid arthritis. Pouyanfar, N., Farnam, G., Ahmadi, M., Masoudifar, R., Banan, K., Asadian, E., Shahhosseini, S., Shahbazi, M. A., Shirazi, F. H., & Ghorbani-Bidkorpeh, F. (2024). International Journal of Biological Macromolecules, 283, Article 137715. https://doi.org/10.1016/j.ijbiomac.2024.137715
26	The progress in ureter tissue engineering. Khan, H. P., Bhagat, A. A. A., Shahbazi, M. A., Saeinasab, M., & Sefat, F. (2024). In F. Sefat, & M. Saeinasab (Eds.), Regenerative Medicine in the Genitourinary System (pp. 89-108). Elsevier. https://doi.org/10.1016/B978-0-443-15834-6.00005-4
27	Transient Mild Photothermia Improves Therapeutic Performance of Oral Nanomedicines with Enhanced Accumulation in the Colitis Mucosa. Ma, Y., Gou, S., Zhu, Z., Sun, J., Shahbazi, M. A., Si, T., Xu, C., Ru, J., Shi, X., Reis, R. L., Kundu, S. C., Ke, B., Nie, G., & Xiao, B. (2024). Advanced materials, Article 2309516. https://doi.org/10.1002/adma.202309516

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