

Dr. Sytze Buwalda

✉ sijtze.buwalda@mines-paristech.fr

Nationality: Dutch

Residence: Nice, France

Date of birth: August 21, 1981

Languages: Dutch (mother tongue), English (C2),

French (C1), German (C1)



CURRENT POSITION

12/2018 – present: Chargé de recherche / Assistant research professor

Biobased Polymers and Composites (BIO) group, Center for Materials Forming (CEMEF), MINES ParisTech, PSL Research University, Sophia Antipolis, France.

Research interests:

- Bio-based polymers, aerogels and hydrogels for biomedical applications
- Bio-based composites, including fiber- and particle-containing hydrogels
- 3D bioprinting

PREVIOUS POSITIONS

06/2015 – 05/2018: Postdoctoral researcher

Department of Artificial Biopolymers, Institute of Biomolecules Max Mousseron (IBMM), University of Montpellier, France.

06/2017 – 05/2018: Surface modification of polyether ether ketone (PEEK) with anti-fouling and anti-bacterial polymers.

Implants based on poly(ether ether ketone) (PEEK) are currently overtaking many other orthopaedic materials such as titanium alloys. Nevertheless, as with any other implant material, PEEK is not free of bacterial contamination. In this project a strategy was developed for the prevention of PEEK implant infection by grafting a combination of anti-fouling polymer and bactericidal polymer onto PEEK via aryl-azide UV photoinsertion. This project was in collaboration with the AO Research Institute in Davos, Switzerland.

Output: 1 article

06/2015 – 05/2017: Self-funded Marie Skłodowska-Curie Individual Fellowship 'L_x micelles: coordination chemistry in doubly stabilized micelles for the targeted delivery of cytostatic drugs in cancer therapy'.

Premature drug release from micelles remains a major challenge in nanomedicine. The platinum based, coordinative L_x linker was introduced in the core of bioresorbable PEG-P(HPMA) based micelles to facilitate (1) coordinative crosslinking between the polymers constituting the micelle and (2) stable coordination between a drug molecule and the polymers constituting the micelle. The project included the synthesis and characterization of monomers, polymers and micelles as well as *in vitro* release and cell experiments.

Output: 6 articles

01/2014 – 02/2015: Postdoctoral researcher

Department of Bifunctional Ligands and Biodegradable Polymers, Laboratory of Fundamental and Applied Heterochemistry, Paul Sabatier University, Toulouse, France.

This project, which was carried out in collaboration with the industrial partner Graftys SA, focused on the development of biodegradable polymers via organo-catalyzed polymerization for the enhancement of the

mechanical properties of bone cements. The project included the synthesis and characterization of various classes of polymers such as PEG-PLA based amphiphilic block copolymers and natural-synthetic hybrid polymers, as well as their functional evaluation in calcium phosphate bone cements.

Output: 1 article

03/2012 – 12/2013: Postdoctoral researcher

Department of Pharmaceutics, Utrecht Institute for Pharmaceutical Sciences, Utrecht University, The Netherlands.

The L_x linker is a molecule which exploits platinum coordination chemistry to couple 2 (macro)molecules of biological interest. Many cytotoxic drugs and antibodies contain suitable coordination sites such as nitrogen or sulphur atoms, allowing their straightforward coupling via the L_x linker without the need of laborious chemical derivatization, which may affect their biological activity. The project, which was carried out with the industrial partner LinXis Pharmaceuticals, covered various stages in the development of target-cell directed antibody-drug conjugates (ADCs) such as doxorubicin- L_x -cetuximab, including their synthesis, characterization and functional evaluation.

Output: 3 articles, 1 patent

EDUCATION

Doctorate

Department of Polymer Chemistry and Biomaterials, Faculty of Science and Technology, University of Twente, Enschede, The Netherlands.

Completion date: 08/12/2011

Supervisor: Prof. Dr. J. Feijen

Title of doctoral thesis: Hydrogels based on amphiphilic PEG star block copolymers.

Most physically and chemically crosslinked hydrogels that have been applied as controlled drug delivery systems are based on linear amphiphilic PEG copolymers. However, star block copolymers offer various advantages over linear polymers such as a higher concentration of end groups. The aim of the research was to design and prepare physically or chemically crosslinked injectable hydrogels from PEG-PLA star block copolymers. Amphiphilic block copolymers with varying molecular weight, hydrophobic block length and hydrophilic/hydrophobic ratio were synthesized and characterized for their thermal properties and aggregation behaviour in aqueous solution. Furthermore the mechanical properties, gelation mechanism and the hydrogel degradation mechanism were studied in detail. Lastly, their potential application as systems for the controlled delivery of biologically active agents was evaluated.

Output: 8 articles

Master

Department of Polymer Chemistry and Biomaterials, Faculty of Science and Technology, University of Twente, Enschede, The Netherlands.

Main subject: biomedical polymers (study: chemical engineering, major in biomedical material science)

Completion date: 25/04/2007

Internship: DSM Composite Resins R&D, Zwolle, the Netherlands (6 months, 10/2004 – 03/2005).

Title of master thesis: Biodegradable chemically crosslinked PEG-PLLA hydrogels for drug delivery.

PROJECTS & GRANTS

2021 – 2024: ANR Jeunes Chercheurs/Jeunes Chercheuses grant (ANR JCJC, 215 k€)

PhD project '3D-AER-HYAL: 3D printing of hyaluronic acid aerogels as on-demand removable wound dressings'. Individual grant from the 'Young Researcher' scheme of the French National Research Agency.

2020: Young Talents France-China Program (French and Chinese Ministries responsible for scientific research)

Personal travel grant for 6 weeks of research at Soochow University. Topic: Bio-based aerogels for controlled drug delivery.

2020: Van Gogh Program (Campus France - Partnerships Hubert Curien)

Inter-academic exchange with Utrecht University. Topic: Functional aerogels for wound dressings and tissue engineering (AEROMED). Co-applicant.

10/2019 – 09/2022: CNRS program 'Thèse Transverse/Transversal Doctorate' (1 PhD student)

PhD project '3D printing of biobased polymer aerogels for biomedical applications'. Co-applicant and co-supervisor (thesis director: Dr. T. Budtova).

06/2015 – 05/2017: Marie Skłodowska-Curie Individual Fellowship (175 k€)

Research project 'L_x micelles: coordination chemistry in doubly stabilized micelles for the targeted delivery of cytostatic drugs in cancer therapy'. This project proposal was entirely designed and written by myself.

PUBLICATIONS

- 23 articles in international peer-reviewed scientific journals, 1 patent
- h-index 11

SUPERVISION OF STUDENTS & TEACHING ACTIVITIES

Supervision

- Co-supervision of 1 postdoctoral researcher
- Co-supervision of 2 PhD students
- Supervision of > 10 other students (Master, Erasmus, Bachelor, ...)

Teaching

- 01/2008 – 03/2010: practical course 'Chemistry and Biomaterials' for 1st year Biomedical Engineering students (80 hours/year, University of Twente, The Netherlands).
- 08/2013 – 12/2013: work group teacher in the course 'Information Resources' for 2nd year Pharmacy students (125 hours, Utrecht University, The Netherlands).

CONFERENCES

Organisation

- Co-organization of the conference 'Advanced Functional Polymers for Medicine 2022' which will be held in Sophia-Antipolis, France.
- Co-organization of the conference 'Advanced Functional Polymers for Medicine 2018' (~100 participants) which was held in Montpellier, France in May 2018.

Contributions

- 13 oral & 13 poster presentations at international conferences.

MISCELLANEOUS SCIENTIFIC ACTIVITIES

Current

- Board Member, Controlled Release Society (CRS) BeNeLux & France Local Chapter
- Member of the Early Career Researcher Board of the journal *Multifunctional Materials*
- Regular reviewer for various scientific journals (*Biomacromolecules*, *Acta Biomaterialia*, *Journal of Controlled Release*, ...)

Past

- 2012 – 2013: Board Member of the discipline group Biopharmacy and Pharmaceutical Technology, Department of Pharmaceutics, Utrecht Institute for Pharmaceutical Sciences, Utrecht University, The Netherlands.
- 2009 – 2011: Board Member of the discipline group Polymer Chemistry and Biomaterials (PhD student representative), Faculty of Science and Technology, University of Twente, Enschede, The Netherlands.