WEI SHAN (HELEN), TAN

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EXECUTIVE SUMMARY

A PhD candidate at Eindhoven University of Technology developing experimental and analysis frameworks for single-molecule microscopy technique to study high-density biofunctionalized 2D and 3D surfaces, with the goal of understanding the impact of bioconjugation methods and conditions on the functionality of the biofunctionalized surfaces. Seeking opportunities to further develop as an independent scientific researcher and to enrich mentoring and teaching experience. Possesses strong interpersonal skills and scientific rigor with a good track record. Future research directions include: (i) advancing single-molecule techniques and analytical frameworks to gain mechanistic insights into biomolecular interactions at sensor interfaces, and (ii) investigating how surface molecular architecture—especially under high-density functionalization—affects the sensitivity, selectivity, and robustness of biosensing platforms in complex biological environments.

EDUCATION & TRAINING

Eindhoven University of Technology, NL July 2021 - Present
Ph.D. Candidate in Molecular Biosensing Group (MBx), Department of Biomedical Engineering
Marie Skłodowska-Curie Actions Doctoral Candidate, CONSENSE

Imperial College London, UK September 2017 - June 2021
MEng Materials Science and Engineering
1st Class Honor (70% and above)

PROFESSIONAL EXPERIENCE

Eindhoven University of Technology, NL Jul. 2021 - present
PhD Candidate

- Led research on the molecular characterization of particle-based continuous biosensor using single-molecule microscopy technique
- Developed analysis framework compatible with single-molecule microscopy technique (DNA-PAINT) for 2D and 3D surfaces
- Studied the dependence of biofunctionalization quality on bioconjugation methods, conditions, molecular systems and substrate material.
- Maintained inventory in the biochemical laboratory
- Mentored bachelor and master's students on research projects and lab safety

Imperial College London, UK Dec. 2019 - June 2021
UROP (Term Time and Summer), Master's Final Year Project

- Researched on Fibre-reinforced hydrated networks (FiHy) with applications in articular cartilage repair
- Performed mechanical testing, developed robust data analysis scripts, and consolidated materials design literature on polymers and biomaterials used in the application of articular cartilage regeneration
- Developed an *in silico* approach for designing FiHy microstructure using a poroelastic model, investigated the effect of experimental conditions and intrinsic material properties of FiHy on fluid load support and validated the model using experimental data

Institute of Science and Technology (IST), AT June 2019 - Sept. 2019
Summer Scientific Research Internship (ISTernship)

- Researched on the fabrication of thermoelectric thin films from solution-processed nanocrystals via spin-coating

· Optimised the spin-coating procedures for thermoelectric thin films and deposited a homogeneous thin film on SiN substrate to be tested for its thermoelectric properties

Imperial College London, UK Sept. 2018 - Mar. 2019
UROP (Term Time)

· Perfomed research on copper oxide (CuO) nanostructures for non-ezymatic glucose sensing
· Studied the effect of acid concentration on CuO nanostructures in a clean-room setting

University Malaysia Sabah, MY Jan. 2017 - Mar. 2017
Research Exposure Opportunity

· Performed research on two small projects: Ozone water storage system design project and fabrication of zinc oxide (ZnO) thin film
· Designed a functioning and effective ozone water storage system, performed a literature review on the damage mechanism of ZnO thin film and fabricated the thin films via physical vapor deposition (PVD) method

PEER REVIEWED PUBLICATIONS

Published

1. **WS Tan**, AM de Jong, and MWJ Prins, Revealing Spatial Molecular Heterogeneity of High-Density Biofunctionalized Surfaces Using DNA-PAINT, *ACS Applied Materials & Interfaces* (2024): DOI 10.1021/acsami.4c10310
2. AC Moore, et al [including **WS Tan**], and MM Stevens, Fiber Reinforced Hydrated Networks Recapitulate the Poroelastic Mechanics of Articular Cartilage, *Acta Biomaterialia* (2023): DOI 10.1016/j.actbio.2023.06.015
3. **WS Tan**, AC Moore, and MM Stevens, Minimum Design Requirements for a Poroelastic Mimic of Articular Cartilage, *Journal of the Mechanical Behavior of Biomedical Materials* (2023): DOI 10.1016/j.jmbbm.2022.105528

In preparation

1. **WS Tan**, AM de Jong, and MWJ Prins, Spatial Molecular Heterogeneity on Biofunctionalized Microparticles Quantified by Three-Dimensional Single-Molecule DNA-PAINT (April 2025)
2. **WS Tan**, AM de Jong, and MWJ Prins, Simulation–Driven Exploration of Experimental Constraints in DNA-PAINT for Accurate Molecular Quantification (April 2025)

PODIUM PRESENTATIONS

1. **WS Tan**, AM de Jong, MWJ Prins, A single-molecule view on biosensor functionalization: how to quantify the density and distribution of affinity molecules on biosensing surfaces, Biosensors 2025 35th Anniversary World Congress on Biosensors, Lisbon, PT, May 2025
2. **WS Tan**, AM de Jong, MWJ Prins, A single-molecule study on biofunctionalization-induced spatial molecular heterogeneity of high-density surface-bound molecules, NWO CHAINS, Veldhoven, NL, December 2024
3. **WS Tan**, AM de Jong, MWJ Prins, Spatial molecular characterization of high-density biofunctionalized surfaces using DNA-PAINT, Institute for Complex Molecular Systems (ICMS) Advanced Analysis Lecture Series, Eindhoven, NL, October 2024

TEACHING EXPERIENCE

Experimental Physics III - Eindhoven University of Technology, NL 2022 - 2024
Teaching Assistant

· Laboratory modules, $\approx$ 40 students
· Supervised labs (visible light absorbance experiments, laser-induced fluorescence experiments, data fitting and analysis)
· Graded all lab reports
· Held discussion sessions (throughout lab work and after report gradings)

MENTORING AND SUPERVISION

Mentoring of Master's Students - TU/e, NL 2022 - present

Drafted project proposals, provided day-to-day technical training and support, held weekly team meetings, and helped students prepare research outputs (research presentation and thesis)

- Chee-Lok Wong (MSc) - A dual-color DNA-PAINT study of high-density biofunctionalized surfaces
- Marleen Aaldering (MSc) - Molecular characterization of biofunctionalized microparticles using 3D DNA-PAINT

Mentoring of Bachelor Students - TU/e, NL 2022 - 2024

Drafted project proposals, provided day-to-day technical training and support, held weekly team meetings, and helped students prepare research outputs (research presentation and thesis)

- Anne Oor (BSc) - AFM surface characterization of spin-coated polymeric thin film (mechanical property)
- Johan Koppen (BSc) - AFM surface characterization of spin-coated polymeric thin film (surface property, effect of spin-coating parameters)
- Ricardo Loock (BSc) - AFM surface characterization of spin-coated polymeric thin film (surface property, effect of post-treatment)
- Isabelle Sewsahai (BSc) - Covalent functionalization of microparticles with applications in particle-based continuous biosensor

HONORS AND AWARDS

OeAD Scholarship 2019

- Awarded to selected candidates for ISTernship summer program aat IST Austria

Dean's List 2017 - 2018

- Awarded by Imperial College Faculty of Engineering for students with overall performance above 70% and within top 10% of the cohort

TECHNICAL STRENGTHS AND LANGUAGES

Software & Tools	Python (NumPy, SciPy, Scikit), MATLAB, LaTeX, FEBio, Gmsh, Microsoft Office
Languages	English (Fluent), Chinese (Native), Malay (Fluent), Japanese (Intermediate), Cantonese (Fluent), Dutch (Beginner)

REFERENCES

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