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Education

- 01/2019 - Present **Eidgenössische Technische Hochschule (ETH) Zürich**
Doctoral candidate in Department of Health Sciences and Technology, exam scheduled (February, 2022)
Mentored Master Students: **Mengdi Liu** (LMU München, master thesis), **Ruben Pianegonda** (ETH Zürich, master internship), **Irene Rodríguez Fernández** (LMU München, master thesis).
- 09/2016 - 11/2018 **Ludwig-Maximilians-Universität (LMU) and Technische Universität (TU) München**
Degree: **Master of Science** (with **Merit**), **Geomaterialien und Geochemie**
Final Grade: **1.62**, including one semester converted from **University of Rennes 1 (UR 1)**, France
Thesis Grade: **1.0**, Grade of three semesters in **LMU & TU München: 1.34**
Dual diploma ("Très bien", **17.096**) in **Physique Fondamentale et Applications, UR 1**
Honours: **Erasmus+** Grant for the exchange in **UR 1** (2880 Euros), **LMU München**
Fondation Rennes 1 (5000 Euros), **UR 1**
- 09/2014 - 06/2016 **National Cheng Kung University**
Degree: **Master of Science, Materials Science and Engineering**
- 09/2009 - 06/2013 **Soochow University**
Degree: **Bachelor of Engineering, Polymer Materials and Engineering**
Honours: Learning Merit Scholarship (1 of 122 selected competitors, 2010), **Soochow University**

Professional Experience

- 01/2019- 12/2021 **Doctoral Thesis, Group of Bacteria at Surfaces, Laboratory for Biointerfaces, Empa - Swiss Federal Laboratories for Materials Science and Technology**
Supervised by Dr. Qun Ren and Prof. Katharina Maniura
Topic: Fighting AMR bacteria: from bacteriophage-based biosensors to controlled treatment system
Aspect I: Bacteriophage-based biosensors
 - Magnetic biosensor development based on surface functionalisation of bacteriophage-based peptides for antibiotic resistant bacteria detection;
 - Bio-AFM proposed to analyse physical interaction between materials and pathogenic bacteria;
 - XPS, FT-IR, SERS and GI-SAXS desired to characterise the fabricated biosensors;
 - Colorimetric method and PCR expected to be applied to analyse detected bacteria**Aspect II: Controlled treatment system**
 - Biophysical study to optimise the properties of PDMS substrates for bacterial static and dynamic adhesion by bio-AFM and simulation before fabrication of contacting killing devices;
 - Design different materials based on material/surface physical properties for controlled release of antimicrobials;
 - Develop antibacterial materials by encapsulating AMP-secreting bacteria inside material matrix with 3D printing, electrospinning, colloidal synthesis.
- 03/2018- 12/2018 **Master Thesis, Group of Bacteria at Surfaces, Laboratory for Biointerfaces, Empa - Swiss Federal Laboratories for Materials Science and Technology**
Supervised by Dr. Qun Ren and Prof. Wolfgang W. Schmahl
Project One: Mechanistic study of bacterial adhesion on PDMS surfaces

- 02/2017 - 08/2017 **Project Two: Antibacterial mechanism of photo-activated Ti surface towards G+ & G- bacteria**
Research Assistant & Internship, Walter Schottky Institut (WSI) and Institute of Molecular Electronics, Technische Universität München
Advised by Priv.-Doz. Dr. Anna Cattani-Scholz and Dr. Quoc Hung Nguyen
Supervised by Prof. Martin Stutzmann and Prof. Marc Tornow
Project: Biosensor development for rapid and precise DNA sequencing
- 09/2014 - 08/2016 **Research assistant, National Cheng Kung University, Prof. Hwang, Wengsing's Lab**
Project One: The deoxidation and desulphurisation of SS400 steel with Cerium and their effects on the morphology of inclusions and the mechanism of grain formation
Project Two: Deoxidation of SS400 steel with Ti and Mg and effect on inclusion morphology
- 09/2011 - 08/2014 **Research assistant, Soochow University, Prof. Wang, Yanwei's Lab**
Project: Conformational study of cyclic polymer chain by Monte Carlo and Langevin Dynamics method
- 03/2010 - 06/2013 **Research assistant, Soochow University, Prof. Chen, Hong's Lab**
Project One: Protein adsorption & cell adhesion on RGD-functionalized silicon substrate
Project Two: Selective adsorption of immunoglobulin G (IgG) on modified nanomaterials by histidine-containing block copolymers
Fund: Principal Investigator, Soochow University Creative Experiment Fund for Students (5 out of selected 800 candidates) from 06/2011 to 06/2013

Awards

- 06/2019 **Swiss Vacuum Prize 2018 for Master Thesis, Swiss Vacuum Society**

Professional memberships and honorary functions

- 2016 - Present Member of **American Physical Society**
- 2016 - Present Member of **American Chemical Society**
- 2013 - Present Member of **American Economy Society**

Editorial Activities

- 2015 - Present **Associate Manager, LSA** (Light: Science & Applications, Nature Publishing Group) editorial office in Tainan
- 2016 - Present **Peer Reviewer**, The Journal of Physical Chemistry Letters; Scientific Reports; Optical and Quantum Electronics; Journal of The Minerals, Metals & Materials Society; Photonics Today; Surface and Coatings Technology; Materials; APL Materials; ACS Omega

Skills

TEM (Diffraction, STEM & EDS), Bio-AFM, Fluidic FM, Single molecule force spectroscopy, single cell/bacterium force spectroscopy, SAXS, XPS, XRD, Molecular dynamics, COMSOL, SEM, MATLAB, Adobe illustrator, Adobe photoshop, Adobe After Effects, 3Ds Max, Cinema 4D, Python, C++, Igor Pro, et al.

Languages: English (Full proficiency), Chinese (Mother tongue), German (Good knowledge), French (Basic knowledge)

Publications

- 28 **Pan F**, Altenried S, Scheibler S, Anthis A, Herrmann I, Ren Q*. Rapid differentiation and identification of uropathogens through functionalized magnetic nanoclusters. (in preparation)
- 27 **Pan F**, Altenried S, Scheibler S, Giovannini G, Fernandez I, Anaraki N, Herrmann I, Ren Q*. An ultrafast determination of antimicrobial resistant Staphylococcus aureus specifically captured by functionalized magnetic nanoclusters. (in preparation)

- 26 Hegemann D*, Hanselmann B, Zuber F, **Pan F**, Gaiser S, Rupper P, Maniura-Weber K, Ruffieux K, Ren Q. Plasma-deposited AgOx-doped TiOx coatings enable rapid antibacterial activity based on ROS generation. (Under review with Plasma Processes and Polymers)
- 25 **Pan F***, Altenried S, Zuber F, Zhang S, Chen Q, Ren Q*. Advanced antifouling and antibacterial hydrogels enabled by the controlled thermo-responses of a biocompatible polymer composite. (Under review with Advanced Materials)
- 24 **Pan F**[#], Giovannini G[#], Zhang S, Altenried S, Zuber F, Chen Q, Boesel L, Ren Q*. Tailored design of pH-responsive silica nanoparticles for targeted treatment of skin wound infections. (Under review with Materials Today Bio)
- 23 Wu C[#], **Pan F**[#], Chen Y, Kung P, Su Y*. Evaluating surface plasmon resonance of metal nanoparticles coated on ZnO nanoflower by genetic algorithm neural network machine learning. (Under review with Science Advances) (**shared first author**)
- 22 Buhmann M, Schmidt-Emrich S, Rodriguez Fernandez I, **Pan F**, Gutt B, Stiefel P, Maniura-Weber K, Ramstedt M, Abt D, Ren Q. Urinary tract in vitro models: How relevant are they to predict biofilm formation on medical devices in vivo? (in preparation)
- 21 **Pan F**[#], Liu M[#], Altenried S, Lei M, Yang J, Straub H, Schmahl W, Maniura-Weber K, Guillaume-Gentil O, Ren Q*. Uncoupling of bacterial attachment and detachment on polydimethylsiloxane investigated by empirical and simulation studies. (Under review with Science Advances)
- 20 Wei J, Zhu C, Zeng Z*, **Pan F**, Wan F, Nyström G*, Fu Z*. Bioinspired Cellulose Integrated MXene-Based Hydrogels for Multifunctional Sensing and Electromagnetic Interference Shielding. (Submitted to Advanced Functional Materials)
- 19 Yu R, **Pan F**, Schreine C, Wang X, Bell D, Qiu G*, Wang J*. Quantitative Determination of Airborne Redox-Active Compounds Based on Heating-Induced Reduction of Gold Nanoparticles. *Analytical Chemistry* 2021, 93(44), 14859-14868.
- 18 Kung P[#], **Pan F**[#], Su Y*. Spintronic hydrogen evolution induced by surface plasmon of silver nanoparticles loaded on Fe and Co doping ZnO nanorods. *Journal of Materials Chemistry A* 2021, 9(44), 24863-24873. (**shared first author**)
- 17 Wu C[#], **Pan F**[#], Su Y*. Surface plasmon resonance of gold nano-sea-urchins controlled by machine-learning-based regulation in seed-mediated growth. *Advanced Photonics Research* 2021, 2100052. (**shared first author**)
- 16 **Pan F**, Altenried S, Zuber F, Wagner R, Su Y, Maniura-Weber K, Ren Q*. Photo-activated Ti surface enables bactericidal activity towards Gram positive and negative bacteria at different time scale. *Colloids and Surfaces B: Biointerfaces* 2021, 206, 111940.
- 15 **Pan F**[#], Amarjargal A[#], Altenried S, Liu M, Zuber F, Rossi R, Maniura-Weber K, Ren Q*. Smart nanofibrous membrane for localised on-demand drug delivery regulated by self-stimulated glass transition switch. *ACS Applied Bio Materials* 2021, 4(5), 4271-4279
- 14 Kung P, **Pan F**, Su Y*. Gold nanoparticles on TM: ZnO (TM: Fe, Co) as spinplasmon-assisted electro-optic reaction modulator in solar-to-hydrogen water splitting cell. *ACS Sustainable Chemistry & Engineering* 2020, 8(39), 14743-14751. (**Cover paper**)
- 13 Zeng Z, Wang C, Wu T, Han D, Luković M, **Pan F**, Siqueira G, Nyström G*. Nanocellulose assisted preparation of ambient dried, large-scale and mechanically robust carbon nanotube foams for electromagnetic interference shielding. *Journal of Materials Chemistry A* 2020, 8(35), 17969-17979. (**Cover paper**)
- 12 Milionis A, Tripathy A, Donati M, Sharma C, **Pan F**, Maniura-Weber K, Ren Q, Poulikakos D*. Water-based scalable methods for self-cleaning antibacterial ZnO-nanostructured surfaces. *Industrial & Engineering Chemistry Research* 2020, 59(32), 14323-14333. (**Cover paper**)
- 11 Tseng M, Su Y*, Lai Y, **Pan F**, Kung P. Cobalt– citrate metal– organic-framework UTSA-16 on TiO₂ nanoparticles. In *IOP Conference Series: Materials Science and Engineering* 2020 (Vol. 720, No. 1, p. 012008). IOP Publishing.
- 10 **Pan F**, Altenried S, Liu M, Hegemann D, Bülbül E, Moeller J, Schmahl W, Maniura-Weber K, Ren Q*. A nanolayer coating on polydimethylsiloxane surfaces enables a mechanistic study of bacterial adhesion influenced by material surface physicochemistry. *Materials Horizons* 2020, 7(1), 93-103. (**Cover paper**)
- 9 Lai Y, Del Rosario M, Chen W, Yen S, **Pan F**, Ren Q, Su Y*. Energy-Yielding Mini Heat Thermocells with WS₂ Water-Splitting Dual System to Recycle Wasted Heat. *ACS Applied Energy Materials* 2019, 2(10), 7092-7103. (**Cover paper**)
- 8 Kung P, Cai S, **Pan F**, Shen T, Su Y*. Photonic fano resonance of multishaped Cu₂O nanoparticles on ZnO nanowires modulating efficiency of hydrogen generation in water splitting cell. *ACS Sustainable Chemistry & Engineering* 2018, 6(5), 6590-6598. (**Cover paper**)
- 7 Lai Y, **Pan F**, Su Y*. Firefly-like Water Splitting Cells Based on FRET Phenomena with Ultrahigh Performance over 12%. *ACS applied materials & interfaces* 2018, 10(5), 5007-5013. (**Cover paper**)

- 6 **Pan F***, Chen H, Su Y, Su Y, Hwang W. Inclusions properties at 1673 K and room temperature with Ce addition in SS400 steel. *Scientific reports* 2017, 7(1), 1-8.
 - 5 **Pan F***, Su Y, Augusto J, Hwang W*, Chen H*. Optical inclusion transformation with different amount of cerium addition during solidification of SS400 steel. *Optical and Quantum Electronics* 2016, 48(12), 536.
 - 4 **Pan F***, Zhang J, Chen H, Su Y, Su Y, Hwang W*. Thermodynamic calculation among cerium, oxygen, and sulfur in liquid iron. *Scientific Reports* 2016, 6, 35843.
 - 3 **Pan F***, Zhang J, Chen H, Su Y, Kuo C, Su Y, Chen S, Lin K, Hsieh P, Hwang W*. Effects of rare earth metals on steel microstructures. *Materials* 2016, 9(6), 417.
 - 2 **Pan F***, Tong W, Gu X. Selective Absorption for Immunoglobulin G by Histidine-Immobilized Silicon Nanowire Arrays. *Guangdong Chemical Industry* 2013, (11), 5.
 - 1 Tong W, Liu X, **Pan F**, Wu Z, Jiang W. Protein adsorption and cell adhesion on RGD-functionalized silicon substrate surfaces. *Chinese Journal of Polymer Science* 2013, 31(3), 495-502.
- #Contributed equally & *corresponding author

Conference Organization

- 11/2021 **Organizing committee**, Empa PhD Symposium 2021;, Dübendorf, Switzerland.
- 08/2021 **Scientific Committee**, 2021 International Virtual Conference of Green Materials Applied in Photoelectric Sensors (2021 ICGMAPS);, Tainan, Taiwan.
- 01/2018 **Executive Committee**, Light Conference (Light: Science and Applications, Nature Publishing Group): International Conference on Micro/Nano Optical Engineering -T2018;, Taitung, Taiwan. Light Conference (Light: Science and Applications, Nature Publishing Group): International Conference on Micro/Nano Optical Engineering -T2016;, Tainan, Taiwan.
- 12/2017 **Chair**, Light Conference: TUM students in Light 2017 (Light: Science and Applications, Nature Publishing Group);, Munich, Germany.
- 08/2016 **Conference Secretary**, Light Conference (Light: Science and Applications, Nature Publishing Group): International Conference on Micro/Nano Optical Engineering -T2016;, Tainan, Taiwan.
- 08/2015 **Conference Secretary**, Light Conference (Light: Science and Applications, Nature Publishing Group): International Conference on Micro/Nano Optical Engineering -T2015;, Tainan, Taiwan.

Conference Participation

- 08/2021 **Poster Presentation, Pan F***, Amarjargal A, Altenried S, Liu M, Zuber F, Zeng Z, Rossi R, Maniura-Weber K, Ren Q, Bio-responsive Nanofibrous Materials Enables Controlled Drug Delivery Regulated by Glass Transition Switch at Physiological Conditions. *Biointerfaces International Conference* 2021, Zurich, Switzerland.
- 09/2020 **Poster Presentation, Pan F***, Altenried S, Liu M, Hegemann D, Bülbül E, Moeller J, Schmahl, WW, Maniura-Weber K, Ren Q, 2020, Bacteria Adhesion on Polydimethylsiloxane Surfaces Impacted by Material Viscoelasticity or Surface Chemistry?, *Biofilms* 9, Karlsruhe, Germany.
- 07/2019 **Poster Presentation**, Straub H, **Pan F***, Bigger C, Valentin J, Abt D, Qin X, Eberl L, Maniura-Weber K, Ren Q, 2019, Interaction Between Bacteria and Soft Surfaces Regulated by Surface Physicochemistry or Bacterial mechanosensing? *MaP Graduate Symposium* 2019, Zurich, Switzerland.
- 06/2019 **Poster Presentation**, Straub H, **Pan F***, Bigger C, Valentin J, Abt D, Qin X, Eberl L, Maniura-Weber K, Ren Q, 2019, Mechanism of Bacteria Interaction with Soft Polydimethylsiloxane Surfaces: Tentacle-like Interface. 2019 eCM XIX: Orthopaedic Infection, Davos, Switzerland.
- 06/2019 **Poster Presentation**, Straub H, **Pan F***, Bigger CM, Valentin J, Abt D, Qin X, Eberl L, Maniura-Weber K, Ren Q, 2019, Is Bacteria Adhesion on Polydimethylsiloxane Surfaces Regulated by Tentacle-like Interface or Bacterial Mechanosensing? *Swiss NanoConvention* 2019, Lausanne, Switzerland.
- 04/2019 **Participation**, AMiCl training school in antimicrobial coatings (**Granted 1500 EUR for participation**), 2019, Amsterdam, the Netherlands.
- 10/2018 **Participation**, The Antimicrobial Resistance on Biomaterials Workshop, 2018, St. Gallen Switzerland.
- 10/2018 **Poster Presentation**, Straub H, **Pan F***, Valentin J, Altenried S, Eberl L, Schmahl W, Maniura Weber K, Ren Q, 2018, Bacterial Adhesion on Soft Materials: Passive Physicochemical Interactions or Active Bacterial Mechanosensing? *Empa International Peer Review*;, St. Gallen, Switzerland.

- 09/2018 **Participation**, BIO-AFM Workshop: AFM and Related Techniques for Biological Research, 2018, St. Gallen Switzerland.
- 11/2015 **Conference Paper and Poster, Pan F***, Zhang J, Su Y, Lin K, Lu M, Hwang W, 2015, Thermodynamic Relation of Inclusions Formed in Cerium-deoxidized and -desulfurized SS400 Steel , Annual Conference of Materials Research Society-Taiwan (2015);, Kaohsiung, Taiwan.
- 10/2015 **Conference Paper and Presentation, Pan F***, Zhang J, Su Y, Lin K, Lu M, Hwang W, 2015, Thermodynamic Study of Ce-Modified Inclusion in SS400 Steel, Annual Conference (2015) of the Chinese Institute of Mining & Metallurgical Engineering;; Kaohsiung, Taiwan.
- 09/2015 **Conference Presentation, Pan F***, Zhang J, Su Y, Tseng H, Lu M, Kuo C, Hwang W, 2015, Thermodynamic Calculation and Inclusion Characterization of Ti-Mg Deoxidized Steel, 4th Cross Strait Green Materials & Green Processing Forum;; Beijing, China.