

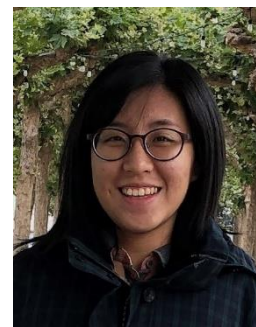
Hsin-Chen Chen

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Nanocellulose reinforced composite materials · Bio-based polymers

ROSLAGSTULLSBACKEN 21, PLAN 2, Stockholm, Sweden

ENSCBP, 16 av. Pey-Berland, Bât A, F-33607 Pessac cedex, France



EDUCATION

Ph.D. student in Chemistry – Division of Glycoscience Jan. 2022 – Present

M.Sc. in Forestry and Resource Conservation – Biological Materials Division Sept. 2018 – July 2020

- GPA: 4.3/4.3, rank: 1/38
- National Taiwan University, Taipei, Taiwan

B.Sc. in Forestry and Resource Conservation – Biological Materials Division Sept. 2014 – June 2018

- GPA: 4.06/4.3, rank: 1/58
- Minor: Horticulture and Landscape Architecture
- National Taiwan University, Taipei, Taiwan

RESEARCH PROJECT PARTICIPATION

Transparent Nanocellulose Thin Films for Piezoelectric Devices Sept. 2021 – Present

- Prepare transparent nanocellulose thin films using mix-fiber compositions and chemical modifications
- Produce piezoelectric device prototypes by printing and assembling them
- Cooperate with Prof. Jian-Zhang Chen's Environmental and Energy Device Laboratory (Institute of Applied Mechanics, National Taiwan University) and present research findings

Resin-free Bonding of Wood Microfibers Sept. 2020 – July 2021

- Produced lignin-containing cellulosic micro-/nanofiber fiberboard and developed board formation and test protocols
- Tuned and optimized the hot-pressing process parameters
- Evaluated the lignin self-bonding effect via mechanical performance and water-resistance of the fiberboards from various fiber sizes, chemical treatments, and thermal activation processes

Nanocellulose-waterborne Polyurethane Composites (M.Sc. Thesis Project) Jan. 2019 – July 2020

- Synthesized waterborne polyurethane materials via emulsification by controlling the ratio of the ingredients and the synthesis conditions and processes
- Evaluated the cellulose nanocrystal and cellulose nanofiber addition effects on the resultant composites
- Cooperated with Prof. Ru-Jong Jeng's Polymer Chemistry Laboratory (Institute of Polymer Science and Engineering, National Taiwan University) and present findings in monthly meetings

Nanocellulose Polymeric Composites for Artwork Conservation June 2017 – Oct. 2019

- Wrote a research proposal with Prof. Feng-Cheng Chang and successfully received a research grant from the Ministry of Science and Technology of Taiwan
- Designed experiments, produced nanocellulose-reinforced composite films, and conducted tests to evaluate the cellulose nanocrystal and cellulose nanofiber reinforcing effects on Aquazol, a polymeric material for artwork conservation

Cellulose Nanofiber-based Aerogel Production Jan. 2017 – Oct. 2018

- Produced cellulose nanofiber-based aerogel with various solid concentrations using freeze drying process

- Assisted the aerogel sample preparation and test execution

Bamboo-based Nanocellulose Whiskers Prepared by Acid Hydrolysis

Aug. 2016 – Sept. 2017

- Produced nanocellulose whiskers from three species of domestic Taiwanese bamboo under different acid hydrolysis conditions
- Analyzed the crystallinity data from X-ray Diffraction tests
- Made a poster on the procedure of nanocellulose whiskers production for 2017 Domestic Wood and Bamboo Products Exhibition held by Council of Agriculture, Executive Yuan of Taiwan

PUBLICATION

Journal Article

- **Chen, H.-C.**, Tze, W.T.Y., and Chang, F.-C. (2020) Effects of Nanocellulose Formulation on Physicomechanical Properties of Aquazol–nanocellulose Composites. *Cellulose*. <https://doi.org/10.1007/s10570-020-03190-x>
- **Chen, H.-C.**, Huang, Y.-C., Wu, C.-H., Jeng, R.-J., and Chang, F.-C. (2022) Stable Emulsion of Cationic Waterborne Polyurethanes with Cellulose Nanocrystals for Enhanced Nanocomposite Performance. *Cellulose*. <https://doi.org/10.1007/s10570-022-04989-6>

Conference Presentations

- **Chen, H.-C.** and Tze, W.T.Y. (2021, Apr.) Resin-free Fiberboard from Lignin-containing Cellulosic Nanofibers. Poster presented at 2021 American Chemical Society Spring Conference, virtual.
- **Chen, H.-C.**, Huang, Y.-C., Wu, C.-H., Jeng, R.-J., Chang, F.-C. (2019, Dec.) Investigation on the Fiber-reinforcing Effects of Nanocellulose-Waterborne Polyurethane Composites. Poster presented at 2019 UTokyo-NTU Joint Conference, Tokyo, Japan.
- **Chen, H.-C.**, Tze, W.T.Y., and Chang, F.-C. (2019, June) Effects of Nanocellulose Formulations on Hygroscopic and Mechanical Properties of Aquazol/nanocellulose Biocomposites. Poster presented at 2019 International Conference on Nanotechnology for Renewable Materials, Chiba, Japan.
- Tze, W.T.Y., Wang, S.-H., **Chen, H.-C.**, and Chang, F.-C. (2019, June) Crosslinking and carbonization of electrospun lignosulfonate fiber. Poster presented at 2019 International Conference on Nanotechnology for Renewable Materials, Chiba, Japan.
- **Chen, H.-C.**, and Chang, F.-C. (2018, Oct.) Feasibility of Using Nanocellulose Composites for Artwork Conservation. Oral presented in English at Pacific Rim Bio-based Composites Symposium, Makassar, Indonesia.
- Lee, H.-C., **Chen, H.-C.**, and Chang, F.-C. (2018, Oct.) Production of Cellulose Nanofiber-based Aerogel and Carbonized Aerogel. Poster presented at Forest Resource Sustainable Development Symposium, Taipei, Taiwan.
- **Chen, H.-C.**, Cramail, H., Llevot, A., and Zhou, Q. (2022, May) TEMPO-oxidized Nanocelluloses as Emulsion Stabilizers for Waterborne NIPU Latexes. Poster presented at GEP-SLAP 2022 Conference (Meeting of the Group Specialized in Polymers of the Spanish Royal Society of Chemistry and Spanish Royal Society of Physics), Donostia-San Sebastian, Spain.

RESEARCH SKILLS

Measurement Technique (Include Data Analysis)

- Mechanical tensile test – MTS Criterion 42.503 Test System
- Mechanical micro tensile test – DEBEN micro tester

- Three-point bending test – Instron 5969 Dual Column Testing System
- Water sorption test – HRMB-80 chamber
- Thermal gravimetric analysis – Mettler-Toledo TGA/SDTA851^e
- Differential scanning calorimetry – Mettler-Toledo DSC823^e
- Fourier-transform infrared spectroscopy analysis – JASCO FT/IR-4600
- Ultraviolet-visible light transmittance – Analytik Jena Specord 50 Plus UV-Vis spectrophotometer
- Surface area and porosity analysis – NOVAtouch Gas Sorption Analyzer
- Dynamic light scattering analysis – NanoBrook 90Plus particle size analyzer
- Contact angle analysis – KRÜSS Drop Shape Analysis System DSA 10

Other Data Analysis

- Microstructure analysis and fiber size measurement
- Zeta potential analysis
- X-ray diffraction analysis

Major Experimental Protocol

- Polymerization for anionic and cationic waterborne polyurethane emulsions
- Acid hydrolysis for cellulose nanocrystal extraction
- Fiberboard formation for lignin-containing cellulosic nanofiber fiberboard

Programming

- R Language

WORK EXPERIENCE

Research Assistant Sept. 2021 – Present

- Prof. Feng-Cheng Chang research group, Department of Forestry and Resource Conservation, National Taiwan University
- Conduct the project – Transparent nanocellulose thin films for piezoelectric devices
- Supervise two Master's degree projects: "Transparent nanocellulose thin films – preparation, modification, and characterization" and "Lignin-containing cellulose nanocrystals from Taiwanese bamboo."

Researcher Sept. 2020 – July 2021

- Prof. William Tai Yin Tze research group, Department of Bioproducts & Biosystems Engineering, University of Minnesota
- Conducted the grant-in-aid project – Redefining wood fiberboard: Resin-free bonding of microfibrillated wood fiber
- Assisted with lab management, including lab safety, equipment maintenance, purchasing, and chemical inventory
- Trained and supervised an undergraduate research student

Graduate Research Assistant Aug. 2019 – July 2020

- Advanced Research Center for Green Materials Science and Technology, National Taiwan University
- Assistant to Prof. Feng-Cheng Chang by conducting the thesis research project and providing study results
- Participated bi-monthly meetings with center members

Teaching Assistant Sept. 2019 – Jan. 2020

- Course: Forest Camp Practice – Biomaterials
- Assisted in managing courses and syllabus
- Communicated with companies and mills for six factory visit/tours

Teaching Assistant

Sept. 2018 – Jan. 2020

- Course: Wood Anatomy and Lab
- Tutored students to improve their ability in identifying various types of wood cells and tissue under microscope observation
- Gave two lectures on “Three Sections of Wood” and developed course materials
- Managed lab sessions, developed homework questions, and graded homework

Teaching Assistant

Sept. 2018 – Jan. 2019

- Course: Forest Products and Practice
- Managed lab sessions, graded quizzes and homework
- Assisted sample preparation before class

HONORS and AWARDS

- Postgraduate Conference Participation Grant, Ministry of Science and Technology 2019
- UTokyo-NTU Joint Conference Participation Grant, National Taiwan University 2019
- Postgraduate Scholarship, School of Forestry and Resource Conservation 2018
(Ranked top four in Special Admission Quotas for Recommended Students)
- College Student Research Scholarship, Ministry of Science and Technology 2017
- SUN, HAI Cultural Foundation Scholarship 2017
- WANG, ZI-DING Forestry Scholarship 2016
- Academic Excellence Award (for undergraduates), National Taiwan University 2015 – 2017 (4 semesters)
(Ranked the top ten percent of class in a semester)