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Squaramide-based interpenetrated networks for load-bearing applications

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Curriculum vitae

Ying Chen was born on July 22, 1992, in Wuyi, China. She graduated from Wuyi First Senior High School in 2010 and pursued a BSc degree in Polymer Science at Hunan University, where she developed an initial interest in science. Afterwards, she began her MSc studies in Polymer Science at Zhejiang University under the supervision of Professor Dr. Zhengwei Mao, where she developed a keen interest in biomaterials. Ying obtained her MSc degree in 2017 and subsequently joined BASF in Shanghai as an assistant chemist. During her nearly two years at BASF, she gained significant experience in emulsion polymerization and contributed to the development of commercial products.

In 2019, Ying joined the Supramolecular & Biomaterials Chemistry (SBC) group at the Leiden Institute of Chemistry, under the supervision of Professor Dr. A. Kros and Dr. Roxanne E. Kieltyka, to pursue her Ph.D. Her doctoral research focused on squaramide-based tripodal supramolecular hydrogels and the advancement of functional materials aimed at understanding cellular responses within synthetic 3D environments. She employed a range of chemical, analytical, and biological methodologies to gain profound insights into the applications of synthetic hydrogels in various biological contexts.

Ying's Ph.D. studies involved collaborations with Professor Dr. M. Drukker (LACDR), Professor Dr. E.S. Jagalska (IBL), and Dr. Y.F.M. Ramos (LUMC). She presented her research through posters at the CHAINS conferences in 2019 and 2020. She delivered oral presentations at IUPAC and CHAINS conferences in the Netherlands in 2023. Ying also had scientific conduct course, summer school science communication, and gave practical courses to the bachelors during her PhD. All the experience helped Ying to develop lots of advanced academic skills such as critical thinking and analysis, technical proficiency, grant writing and application, and teaching. She also gained many soft-skills like problem-solving, time management, ethical and professional conduct. These competencies equip her for diverse career paths in and beyond academia. Currently, Ying is working as a process engineer in medical device field, and she is excited to continue her career in innovative biomaterials and apply her expertise to advance the field further in the future.

List of Publications

Publications relating to this thesis

1. ***Ying Chen***,[+] Ciqing Tong,[+] Roxanne E. Kieltyka*, Ditholane-Norbornene Photopolymerization of a Hybrid Covalent and Filamentous Supramolecular Biomaterial Permits Cyclic Compressive Loading in 3D Cell Culture, *submitted*.
2. ***Ying Chen***, Roxanne E. Kieltyka*, A Photoresponsive Filamentous Supramolecular-Nanocomposite Double Network Gel for 3D Cancer Therapy, *submitted*.
3. ***Ying Chen***, Roxanne E. Kieltyka*, Fast stress relaxation of Multi-topologies Double Network Hydrogel for Cyclic Loading in 3D Chondrocyte Culture, *to be submitted*.
4. ***Ying Chen***, Roxanne E. Kieltyka*, A bio-orthogonal Crosslinked Filamentous Supramolecular Biomaterial for Anisotropic 3D neuron stem cell culture and differentiation, *to be submitted*.
5. ***Ying Chen***,[+] Francesca Lauria,[+] Roxanne E. Kieltyka*, Understanding the Self-Assembly of Tripodal Squaramide-Based Monomers through Structural Substitution, *to be submitted*.
6. ***Ying Chen***, Roxanne E. Kieltyka*, Biomimetic Poroviscorelaxation in a Hybrid Covalent and Filamentous Supramolecular Biomaterial in 3D Cell Culture, *in preparation*.
7. ***Ying Chen***, Roxanne E. Kieltyka*, Biomimetic Strain-stiffening in bio- orthogonal dynamic-covalent hydrogel networks, *in preparation*.
8. Ciqing Tong, Joeri A. J. Wondergem, Marijn van den Brink, Markus C. Kwakernaak, ***Ying Chen***, Marco M. R. M. Hendrix, Ilja K. Voets, Erik H. J. Danen, Sylvia Le Dévédec, Doris Heinrich, and Roxanne E. Kieltyka*, Spatial and Temporal Modulation of Cell Instructive Cues in a Filamentous Supramolecular Biomaterial. ACS Appl. Mater. Interfaces, 2022, 14, 17042-17054.

Publications from other work

9. Cuixia Bi, Jin Chen, ***Ying Chen***, Yahui Song, Anran Li, Shuzhou Li, Zhengwei Mao,* Changyou Gao, Dayang Wang, Helmuth Möhwald, and Haibing Xia*,Realizing a Record Photothermal Conversion Efficiency of Spiky Gold Nanoparticles in the Second Near-Infrared Window by Structure-Based Rational Design. Chem. Mater., 2018, 30, 2709-2718.
10. Hong Zhu*, ***Ying Chen***, Fang-Jie Yan, Jin Chen, Xin-Feng Tao, Jun Ling, Bo Yang, Qiao-Jun He, Zheng-Wei Mao*. Polysarcosine brushes stabilized gold nanorods for *in vivo* near-infrared photothermal tumor therapy. Acta Biomaterial, 2017, 50, 534-545.
11. ***Ying Chen***, Zhengqing Xu, Xinfeng Tao, Hong Zhu, Zhengwei Mao*, Jun Ling*. Gold nanoparticles coated with polysarcosine brushes to enhance their colloidal stability and circulation time in vivo. Journal of Colloid and Interface Science, 2016, 483, 201-210.

12. Guoping Sheng, ***Ying Chen***, Lijie Han, Zhengwei Mao*. Encapsulation of indocyanine green into cell membrane capsules for photothermal cancer therapy. Acta Biomaterialia, 2016, 43, 251-261.

13. Lijie Han, ***Ying Chen***, Jie Niu, Lihua Peng, Zhengwei Mao*, Changyou Gao*. Encapsulation of a photosensitizer into cell membrane capsules for photodynamic therapy. RSC Adv.,2016, 6, 37212-37220.

14. Wei Yu, ***Ying Chen***, Zhengwei Mao*. Hollow Polyelectrolyte Microcapsules as Advanced Drug Delivery Carriers. Journal of Nanoscience and Nanotechnology, 2016, 5435-5446.

15. Wei Yu, Wenbo Zhang, ***Ying Chen***, Xiaoxue Song, Weijun Tong*, Zhengwei Mao*, Changyou Gao*. Cellular uptake of poly(allylamine hydrochloride) microcapsules with different deformability and its influence on cell functions. Journal of Colloid and Interface Science, 2016, 465, 149-157.

16. Wenjing Zhang, Pengfei Jiang, ***Ying Chen***, Peihua Luo, Guanqun Li, Botuo Zheng, Wei Chen, Zhengwei Mao*, Changyou Gao*. Suppressing the cytotoxicity of CuO nanoparticles by uptake of curcumin/BSA particles. Nanoscale, 2016, 8, 9572-9582.

17. Li-Hua Peng, Yan-Fen Huang, Chen-Zhen Zhang, Jie Niu, ***Ying Chen***, Yang Chu, Zhi-Hong Jiang, Jian-Qing Gao*, Zheng-Wei Mao*, Integration of antimicrobial peptides with gold nanoparticles as unique non-viral vectors for gene delivery to mesenchymal stem cells with antibacterial activity. Biomaterials, 2016, 103, 137-149.

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“The World is Not Made of Atoms, But of Stories”

I am very grateful for the opportunity to write a pivotal page of my life in Leiden. My journey began with the support of Roxanne and Alexander, who allowed me to work in Leiden university. This period has been enriched with lots of valuable experiences and stories. As this page concludes, it brings a rewarding culmination, not only in scientific research but also in personal growth. Therefore, I am delighted to say that:

“In the End, It’s Not the Years in My Life That Count, It’s the Life in My Years”

I own my deepest gratitude to the SBC group, to the supervisors, my collaborators, my students and my colleagues. I am also profoundly thankful to my family and friends for their unwavering support, and to my bouldering team for helping me build physical strength. You all contributed in your own way to the creation of this thesis.

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