Bowen Cui

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EDUCATION

Ph.D. 09/2018 -- 09/2023 Optical Science and Engineering, Zhejiang University, China
B.S. 09/2014 -- 06/2018 Optical Science and Engineering, Zhejiang University, China

HONORS AND AWARDS

2021	Award for China's Top 10 Optics Breakthroughs (Fundamental Research) *For developing elastic ice optical microfibers*
2021	China's Top 10 Scientific and Technological Breakthroughs
2021	China National Scholarship *One of two recipients selected from 1000 applicants*
2021	Award for Outstanding Contribution, Zhejiang University *One of two recipients in Zhejiang University*
2021	Top 10 Academic Achievements of Students, Zhejiang University
2021	Top 10 Outstanding Students in Optical Science and Engineering College, Zhejiang University
2021	Awards of Honor for Merit Graduate, Zhejiang University
2021, 20, 19	Awards of Honor for Outstanding Graduate, Zhejiang University
2016	First Prize in College Students' Physics Innovation Competition, Zhejiang Province
2016, 15	Outstanding Undergraduate Scholarship, Zhejiang University

JOURNAL PUBLICATIONS

1. P. Z. Xu*, **B. W. Cui*** (contributed equally to this work), Y. Q. Bu, H. T. Wang, X. Guo, P. Wang, Y. Ron Shen, L. M. Tong, "Elastic ice microfibers", ***Science*** 373, 187-192, 2021.
   - The New York Times: A New Kind of Ice That Bends Like a Noodle Without Breaking
   - New Scientist: New kind of ice is so bendy it can curl and uncurl without breaking
   - Science News: These weird, thin ice crystals are springy and bendy
   - Chemistry World: Elastic ice stretch the limits of frozen physics
   - Chemical & Engineering News: Ice crystals that flex and bend & C&EN's Year in Chemistry 2021
   - Phys.org: Making bendable ice by growing single-crystal microfibers
2. **B. W. Cui**, P. Z. Xu, X. Z. Li, K. L. Fan, X. Guo, L. M. Tong, "Low-dimensional and confined ice", ***Annual Review of Materials Research***, 53, 2023.
3. X. Z. Li, **B. W. Cui**, P. Z. Xu, Y. Xie, P. Wang, L. M. Tong, X. Guo, "Ice microsphere optical cavities", ***Advanced Optical Materials***, 230260, 2024.
4. Y. Y. Jin, L. Yang, C. X. Y. Pan, Z. X. Shi, P. Z. Xu, **B. W. Cui**, Y. X. Yang, N. Zhou, X. Guo, P. Wang, L. M. Tong, "Strong coupling of a plasmonic nanoparticle to a semiconductor nanowire", ***Nanophotonics***, 10, 2875-2881, 2021.
5. C. X. Y. Pan, Y. B. Tong, H. L. Qian, A. V. Krasavin, J. L. Li, J. J. Zhu, Y. Y. Zhang, **B. W. Cui**, Z. Y. Li, C. M. Wu, Z. X. Wang, L. F. Liu, L. J. Li, X. Guo, A. V. Zayats, L. M. Tong, P. Wang, "Large-area, freestanding single-crystal gold of single nanometer thickness", ***Nature Communications***, 15, 2840, 2024.
6. P. Z. Xu*, **B. W. Cui*** (contributed equally to this work), Y. Q. Bu, P. Wang, X. Guo, H. T. Wang, L. M. Tong, "Nonlinear elasticity of ice observed in single-crystal ice microfibers", in revision with ***Physical Review Letters***.
7. **B. W. Cui**, P. Z. Xu, K. L. Fan, Y. Q. Zhen, Y. B. Tong, X. Z. Li, R. S. Lu, P. Wang, X. Guo, L. M. Tong, "Small-molecule organic ice optical nanofibers", to be submitted.

RESEARCH EXPERIENCE

2021 – now **Optical Nonlinear Frequency Conversion in Organic Ice Microfibers**

My research developed a general method to fabricate organic ice microfibers with length up to 10 cm and diameter down to 200 nm, which can be used for low-loss linear optical waveguiding and low threshold nonlinear frequency conversion. The basic optical (i.e., refractive index) and mechanical (i.e., Young's modulus and yield strength) properties of organic ice microfibers have also been studied for the first time.

2017 – 2021 **Elastic Ice Microfibers**

My research activities are focused on three areas:

(a) Electric-field enhanced growth of single crystalline ice microfibers

Developed an electric-enhanced-growth method to grow defeat-free ice microfibers with diameters ranging from 10 μm to less than 800 nm.

(b) Optical characterization of ice microfibers

Demonstrated the waveguiding and whispering gallery modes resonance in ice microfibers via evanescent coupling method and field dark-field scattering spectroscopy respectively.

(c) Raman spectroscopy investigation on phase transition of ice microfibers

Firstly realized the fully reversible elastic bending of ice microfibers up to a maximum tensile strain of 10.9%, approaching the theoretical elastic limit of ice; observed the bending induced phase transition (i.e., Ih-II) in ice microfibers using a home-built confocal Raman microscopy.

2017 – 2019 **Fluorescence Spectroscopy and Applications of III-V Semiconductor Nanowires**

In this work, three kinds of III-V semiconductor (i.e., CdS, CdSe and CdTe) nanowires were fabricated by chemical vapor deposition (CVD) method. My research was focused on the investigations of their photoluminescence, light waveguiding and optical nonlinearity, as well as their applications in nano-lasers.

SKILLS

Experimental Skills

Experienced in several spectroscopy measurements and imaging setups, including:

- Home-built systems including confocal Raman spectroscopy, fluorescence spectroscopy, dark-field scattering microscopy and spectroscopy system, dispersion measurement system, cryogenic micro-manipulation system and nano-mechanical texting system.
- Standard optical microscopy (bright/dark field), cryogenic electron microscopy (Cryo-EM), spectroscopic ellipsometer, ultrafast lasers (fs, ns), optical cryostats.

Experienced in several fabrication techniques, including:

- Chemical vapor deposition (CVD), cryogenic focused ion beam (Cryo-FIB), magnetron sputtering and fabrication of micro/nanofiber or tapered fiber.

Simulations& Calculations

DFT calculation software: VASP and Wien2k.
Experienced in calculating energy band structure, density of states, phonon dispersion, mechanical and optical response of materials.

Numerical simulation software: COMSOL, FDTD, Ansys and Abaqus.
Experienced in simulating modes coupling and converting in waveguides, transmission efficiency of fibers, light field distribution of resonators and photonic devices, stress and strain distribution of mechanical structures.

Programming Languages

C, MATLAB, Python.
Experienced in calculating numerical solutions of the nonlinear Schrödinger equation (NLSE), Maxwell's equations and laser rate equations.

Teaching

Teaching assistant for the undergraduate course *Physical Optics* (2019, 2020, 2021) and graduate course *Nanophotonics* (2019).

REFERENCES

1. Prof. Limin Tong (supervisor)
Zhejiang University
E-mail: phytong@zju.edu.cn

2. Prof. Pan Wang (collaborator)
Zhejiang University
E-mail: nanopan@zju.edu.cn

3. Prof. Xin Guo (co-supervisor)
Zhejiang University
E-mail: guoxin@zju.edu.cn