

# Mingming Nie

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## RESEARCH INTERESTS

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(i) Novel ultrafast nonlinear dynamics in photonic structures and incorporate the dynamics to enhance the device performances with focuses on sensing and information processing applications. (ii) High-power and high-energy lasers. (iii) nonlinear frequency conversion

## CAREER BACKGROUND

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| <b>University of Colorado Boulder (CUB)</b>  | <b>Boulder, USA</b>   |
| <ul style="list-style-type: none"> <li>• <b>Postdoctoral Associate, 08/2018-present</b></li> <li>• Advisor: Shu-Wei Huang</li> <li>• Research direction: Novel microcombs generation and applications</li> </ul>       |                       |
| <b>Tsinghua University (THU)</b>   | <b>Beijing, China</b> |
| <ul style="list-style-type: none"> <li>• <b>Ph. D., 09/2013-07/2018</b></li> <li>• Advisor: Qiang Liu</li> <li>• Research direction: Programmable laser pulse generation and high-power laser amplification</li> </ul> |                       |
| <b>University of Electronic Science and Technology of China (UESTC)</b>  | <b>Chengdu, China</b> |
| <ul style="list-style-type: none"> <li>• <b>B. Eng., 09/2009-07/2013</b></li> <li>• Major: Electrical Science and Technology</li> </ul>  |                       |

## PUBLICATION SUMMARY

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- **31 international journal papers**, including **18 papers** published as first author, equal first author, and equal corresponding author: *Nature Communications* (1), *Light: Science & Application* (1), *Progress in Quantum Electronics (Invited)* (1), *Nanophotonics* (1), *APL Photonics (Invited)* (1), *Photonics Research* (1), *Physical Review Applied* (1), *Optics Letters* (4), *Optics Express* (2), *IEEE Journal of Quantum Electronics* (2), *IEEE Photonics Journal* (1), *Applied Optics* (3).
- **6 conference papers or talks**, including **1 CLEO invited talk**.
- **1 US regular patent** (in processing), **5 China invention patents** (authorized).

## JOURNALS

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\* corresponding author, † co-first author

1. **M. Nie\***, J. Musgrave, and S. W. Huang, “Fiber Fabry–Pérot microcavity for nonlinear optics and beyond,” in preparation for *APL Photonics* (2023). (*Invited*)
2. **M. Nie\***, K. Jia\*, Y. Xie, S. Zhu, Z. Xie\*, and S. W. Huang\*, “Synthesized spatiotemporal mode-locking and photonic flywheel in multimode mesoresonators,” *Nature Communications*, 13, 6395 (2022).
3. **M. Nie\*†**, B. Li†, K. Jia, Y. Xie, J. Yan, S. Zhu, Z. Xie, and S. W. Huang\*, “Dissipative soliton generation and real-time dynamics in microresonator-filtered fiber lasers,” *Light: Science & Applications*, 11, 296 (2022).

4. **M. Nie**<sup>\*</sup>, Y. Xie, B. Li, and S. W. Huang<sup>\*</sup>, “Photonic frequency microcombs based on dissipative Kerr and quadratic cavity solitons,” *Progress in Quantum Electronics*, 86, 100437 (2022). (Invited)
5. **M. Nie**, Y. Xie, and S. W. Huang<sup>\*</sup>, “Deterministic single Kerr soliton generation in doubly resonant degenerate optical parametric oscillator,” *Nanophotonics*, 10(6), 1691-1699 (2021).
6. **M. Nie**<sup>\*</sup>, and S. W. Huang<sup>\*</sup>, “Quadratic Solitons in Singly Resonant Degenerate Optical Parametric Oscillators,” *Physical Review Applied*, 13(4), 044046 (2020).
7. **M. Nie**, and S. W. Huang<sup>\*</sup>, “Quadratic soliton mode-locked degenerate optical parametric oscillator,” *Optics Letters*, 45(8), 2311-2314 (2020).
8. **M. Nie**<sup>\*</sup>, and S. W. Huang<sup>\*</sup>, “Symbiotic quadratic soliton mode-locked nondegenerate optical parametric oscillators,” *Optics Letters*, 45(15), 4184-4187 (2020).
9. **M. Nie**<sup>†</sup>, Y. Jiang<sup>†</sup>, X. Fu, and Q. Liu<sup>\*</sup>, “Deterministic optical rogue waves in Nd: YVO<sub>4</sub> lasers induced by near-degenerate transverse modes,” *IEEE Journal of Quantum Electronics*, 56(4) 1700205 (2020).
10. **M. Nie**<sup>\*</sup>, J. Wang, and S. W. Huang<sup>\*</sup>, “Solid-state Mamyshev oscillator,” *Photonics Research*, 7(10), 1175-1181 (2019).
11. R. Guo<sup>†</sup>, **M. Nie**<sup>†</sup>, Q. Liu, and M. Gong<sup>\*</sup>, “Short pulse close to round-trip time generated by cavity-less high-gain Nd: GdVO<sub>4</sub> bounce geometry,” *Optics Express*, 27(13), 18695-18705 (2019).
12. **M. Nie**, Q. Liu<sup>\*</sup>, E. Ji, X. Cao, X. Fu, and M. Gong, “Active pulse shaping for end-pumped Nd: YVO<sub>4</sub> amplifier with high gain,” *Optics Letters*, 42(6), 1051-1054 (2017).
13. **M. Nie**, X. Cao, Q. Liu<sup>\*</sup>, E. Ji, and X. Fu, “100 μJ pulse energy in burst-mode-operated hybrid fiber-bulk amplifier system with envelope shaping,” *Optics Express*, 25(12), 13557-13566 (2017).
14. E. Ji<sup>†</sup>, **M. Nie**<sup>†</sup>, X. Fu, Z. Guan, and Q. Liu<sup>\*</sup>, “Cr<sup>2+</sup>: CdSe passively Q-switched Ho: YAG laser,” *Optics Letters*, 42(13), 2555-2558 (2017).
15. **M. Nie**, Q. Liu<sup>\*</sup>, E. Ji, X. Cao, F. Xing, and M. Gong, “High peak power hybrid MOPA laser with tunable pulse repetition frequency and pulse duration,” *Applied Optics*, 56(12), 3457-3461 (2017).
16. Q. Liu, **M. Nie**<sup>\*</sup>, F. Lu, and M. Gong, “High-Power, Wavelength-Locked 878.6 nm In-Band Pumped, Acoustic-Optically Q-Switched Nd:YVO<sub>4</sub> MOPA Laser With TEM<sub>00</sub> Mode,” *IEEE Photonics Journal*, 8(4), 1-9 (2016).
17. **M. Nie**, Q. Liu<sup>\*</sup>, E. Ji, X. Cao, X. Fu, and M. Gong, “Design of High-Gain Single-Stage and Single-Pass Nd: YVO<sub>4</sub> Amplifier Pumped by Fiber-Coupled Laser Diodes: Simulation and Experiment,” *IEEE Journal of Quantum Electronics*, 52(8), 1-10 (2016).
18. **M. Nie**, Q. Liu<sup>\*</sup>, E. Ji, X. Fu, and M. Gong, “Gain change by adjusting the pumping wavelength in an end-pumped Nd:YVO<sub>4</sub> amplifier,” *Applied Optics*, 55(18), 4946-4951 (2016).
19. **M. Nie**, Q. Liu<sup>\*</sup>, E. Ji, and M. Gong, “End-pumped temperature-dependent passively Q-switched lasers,” *Applied Optics*, 54(28), 8383-8387 (2015).
20. E. Tsao<sup>\*</sup>, Y. Xie, **M. Nie**, and S. W. Huang<sup>\*</sup>, “Monostable dissipative Kerr soliton,” *Optics Letters*, 47(1), 122-125 (2022).
21. Y. Jiang, **M. Nie**, R. Guo, X. Fu, and Q. Liu<sup>\*</sup>, “Pushing the limit of pulse duration in Q-switched solid-state lasers with high gain,” *Optics & Laser Technology*, 129, 106276 (2020).
22. E. Ji, **M. Nie**, and Q. Liu<sup>\*</sup>, “13.5 mJ polarized 2.09 μm fiber-bulk holmium laser and its application to a mid-infrared ZnGeP<sub>2</sub> optical parametric oscillator,” *Chinese Optics Letters*, 15(9), 091402 (2017).
23. E. Ji, Q. Liu<sup>\*</sup>, **M. Nie**, X. Cao, X. Fu, and M. Gong, “High-slope-efficiency 2.06 μm Ho: YLF laser in-band pumped by a fiber-coupled broadband diode,” *Optics Letters*, 41(6), 1237-1240 (2016).
24. Z. Zhang, Q. Liu<sup>\*</sup>, **M. Nie**, E. Ji, and M. Gong, “880-nm-Diode-Laser-End-Pumped

- Electrooptically Q-Switched Nd: YLF Laser With High Energy and Good Beam Quality at 1047 nm and 1 kHz,” *IEEE Photonics Journal*, 8(1), 1-8 (2016).
25. Z. Zhang, Q. Liu\*, **M. Nie**, E. Ji, and M. Gong, “Experimental and theoretical study of the weak and asymmetrical thermal lens effect of Nd: YLF crystal for  $\sigma$  and  $\pi$  polarizations,” *Applied Physics B*, 120(4), 689-696 (2015).
  26. E. Ji, Q. Liu\*, **M. Nie**, X. Fu, and M. Gong, “Theoretical and experimental analysis of high-power frequency-stabilized semiconductor master oscillator power-amplifier system,” *Applied Optics*, 55(11), 2909-2914 (2016).
  27. E. Ji, Y. Shen, **M. Nie**, X. Fu, and Q. Liu\*, “Spectra-and temperature-dependent dynamics of directly end-pumped holmium lasers,” *Applied Physics B*, 123(4), 1-11 (2017).
  28. E. Ji, Q. Liu\*, **M. Nie**, H. Luo, Y. Hu, Z. Guan, and M. Gong, “Spectroscopic properties of heavily Ho<sup>3+</sup>-doped barium yttrium fluoride crystals,” *Chinese Physics B*, 24(9), 094216 (2015).
  29. E. Ji, Q. Liu\*, X. Cao, **M. Nie**, X. Fu, and M. Gong, “Resonantly Fiber-Coupled Diode-Pumped Ho<sup>3+</sup>:YLiF<sub>4</sub> Laser in Continuous-Wave and Q-Switched Operation,” *IEEE Journal of Quantum Electronics*, 52(7), 1-8 (2016).
  30. E. Ji, Q. Liu\*, X. Fu, P. Du, **M. Nie**, F. Zhang, and M. Gong, “High-Brightness Semiconductor Laser-Pumped 1.56  $\mu$ m Polarization-Entangled Photon Pairs,” *IEEE Journal of Quantum Electronics*, 53(2), 1-6 (2017).
  31. E. Ji, Q. Liu\*, Y. Shen, **M. Nie**, and X. Fu, “Generation of watt-level 2.06  $\mu$ m polarized light from diode wing-pumped Ho: YLF laser,” *IEEE Photonics Technology Letters*, 29(19), 1695-1698 (2017).
  32. P. Li, X. Wang\*, H. Su, Y. Wei, **M. Nie**, and Q. Liu\*, “Analysis of laser modes in high power unstable resonators with intra-cavity wavefront aberrations,” *Journal of Optics*, 17(4), 045804 (2015).

## CONFERENCES

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1. **M. Nie**\*, “Multimode fiber microcomb and beyond,” *CLEO: Science and Innovations*, 2023. (Invited) <https://www.cleoconference.org/home/program/science-innovations-invited-speakers/>
2. **M. Nie**\*, and S. W. Huang\*, “Dissipative Kerr soliton induced by intermodal cascaded stimulated Brillouin scattering in graded-index multimode fiber Fabry-Pérot microresonators,” *CLEO: Science and Innovations*, Optical Society of America, STu1C.5, 2022.
3. **M. Nie**\*, and S. W. Huang\*, “Photonic microwave synthesizer in microresonator-filtered fiber lasers,” *CLEO: Science and Innovations*, Optical Society of America, SS1B.5, 2022.
4. **M. Nie**\*, B. Li, and S. W. Huang\*, “Dissipative soliton generation and interaction in Chimera laser cavities,” *CLEO: Science and Innovations*, Optical Society of America, STu1C.3, 2022.
5. **M. Nie**\*, Y. Xie, and S. W. Huang\*, “Spatiotemporal Mode-Locked sub-Hertz Fundamental Linewidth Soliton Microcombs for Photonic Flywheel,” *Nonlinear Optics Topical Meeting*, Optical Society of America, NF1A.2, 2022.
6. **M. Nie**\*, and Q. Liu, “Active pulse shape control in a solid-state MOPA system with narrow linewidth and high peak power,” *Advanced Solid State Lasers*, Optical Society of America, JTu2A.30, 2017.

## PATENTS

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1. **M. Nie** (50%), and S. W. Huang (50%), “Turnkey microcomb and photonic flywheel,” in processing.
2. Q. Liu, Y. Jiang, and **M. Nie**, “Burst-mode short pulse laser system and control method,” ZL201910759984.4, 01/26/2021. (China Invention Patent)

3. Q. Liu, **M. Nie**, and Y. Jiang, "A laser system and method to generate controllable arbitrary time-domain waveform," ZL201810714994.1, 07/12/2019. (China Invention Patent)
4. Q. Liu, **M. Nie**, and F. Lu, "Design method of solid-state laser amplifier with small signal input," ZL 201610140694.8, 04/05/2019. (China Invention Patent)
5. Q. Liu, **M. Nie**, F. Lu, and M. Gong, "A laser generating system and method," ZL201510229630.0, 11/21/2017. (China Invention Patent)
6. Q. Liu, **M. Nie**, F. Lu, and M. Gong, "An arbitrary time-domain waveform generator with high pulse repetition frequency and sub-nanosecond pulse width," ZL201510230744.7, 07/07/2017. (China Invention Patent)

### **AWARDS & HONORS**

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Outstanding Graduates of Beijing	2018
Academic Rising Star of Department of Precision Instrument	2018
Finalist of Graduate Fellowship with the Highest Honor (30/4000)	2017
National Scholarship	2017
Best Oral Award (495 <sup>th</sup> Doctoral Forum of Tsinghua University)	2017
First Class Scholarship of Tsinghua University	2016
Outstanding Undergraduates of Sichuan Province	2013
First Prize of National English Competition for College Students	2011
National Scholarship; Pacemaker to Merit Student	2011 & 2012
People's Principal Scholarship	2010

### **SERVICE TO THE SCIENTIFIC COMMUNITY**

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- Reviewer of *Optics Letters*, *Optics Express*, *Applied Optics*, *Optics Continuum*, *IEEE Journal of Quantum Electronics*, and *Infrared Physics and Technology*
- Guest editor of *Frontiers in Photonics*