

About us

Welcome to Our Group

Kaihui Liu's group has been long engaged in studying growth mechanism and spectral physics for low-dimensional materials. We independently designed the meter-scale single-crystal manufacturing equipment, built the single nano-object level in-situ optical characterization system and developed two-dimensional material composite fibers for all-fiber integration devices. We have made several important progresses, including (1) realizing surficial and interfacial engineering of the growth of 2D materials; (2) developing global methods of synthesizing meter-sized single-crystal films; (3) fabricating structure-dependent devices. Professor Liu has published more than 100 scientific journals, including correspondence-authored Nature (2), Nature Nanotechnology (2), Nature Photonics, Nature Chemistry, Nature Communications (4), Advanced Materials (10), JACS (2), Nano Letters (5), PNAS and Science Bulletin.



Breaking News

Breaking News

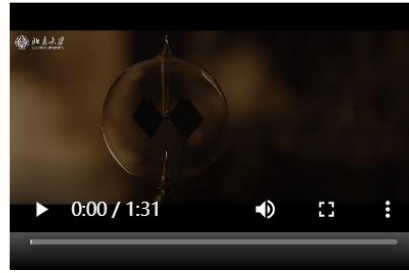
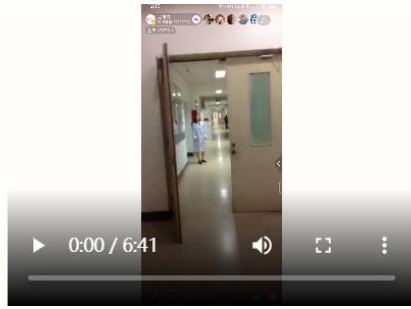
- **202102:** The work of our group was selected as “**one of the top ten research progress of China's semiconductors in 2020**”.
- **202011:** Professor Liu was selected in “**The National Science Fund for Distinguished Young Scholars**”. [Link1](#) [Link2](#)
- **202009:** Our research paper "Optical fibres with embedded two-dimensional materials for ultrahigh nonlinearity" was published on **Nature Nanotechnology**. [Link1](#) [Link2](#) [Link3](#)



202009: Prof. Liu introduced ultra-violet.

Prof. Liu introduced anti-blue light on CCTV.

- **202005:** Our research paper "Seeded growth of large single-crystal copper foils with high-index facets" was published on **Nature**. [Link1](#) [Link2](#) [Link3](#) [Link4](#) [Link5](#) [Link6](#) [Link7](#) [Link8](#) [Link9](#) [Link10](#) [Link11](#) [Highlight](#)
- **201911:** Professor Liu was selected in “**Beijing Municipal Natural Science Foundation for Distinguished Young Scholars**”. [Link1](#)
- **201908:** Our research paper "Graphene photonic crystal fibre with strong and tunable light–matter interaction" was published on **Nature Photonics**. [Highlight Story](#) [Link1](#) [Link2](#) [Link3](#) [Link4](#)
- **201907:** Our research paper "Kinetic modulation of graphene growth by fluorine through spatially confined decomposition of metal fluorides" was published on **Nature Chemistry**. [Link1](#) [Link2](#) [Link3](#) [Link4](#) [Link5](#) [Link6](#)



- 201906: Guangming Daily do a **live broadcast** on our lab. Our laboratory participated in **PKU Disciplines Season 1 Physics Episode**.
- 201905: Our research paper "Epitaxial growth of a 100-square-centimetre single-crystal hexagonal boron nitride monolayer on copper" was published on **Nature**. [Link1](#) [Link2](#) [Link3](#) [Link4](#) [Link5](#) [Link6](#) [Link7](#) [Link8](#) [Link9](#) [Link10](#) [Link11](#) [Link12](#)
- 201808: Our research paper "Measurement of complex optical susceptibility for individual carbon nanotubes by elliptically polarized light excitation" was published on **Nature Communications**. [Link1](#) [Link2](#)
- 201801: Professor Liu was appointed as the **Associate Editor for Science Bulletin**.
- 201712: Professor Liu got the third prize of the 2017 **Beijing Science & Technology Award**.
- 201712: Professor Liu was selected as the 2017 **Excellent Advisor Teacher in Undergraduate's Scientific Research**.
- 201711: Professor Liu was selected as 2017 "**Beijing Excellent Youth Professor**". [Link1](#) [Link2](#)
- 201711: Professor Liu was selected as 2017 Peking University "**Huang Tingfang/Xin He Excellent Youth Scholar**".
- 201711: Liu Group got a first in the third "**Star of Nanotechnology**" innovate business contest and a technology-leading prize.
- 201707: Our research paper "Ultrafast epitaxial growth of metre-sized single-crystal graphene on industrial Cu foil" was published on **Science Bulletin**. [Link1](#) [Link2](#) [Link3](#) [Link4](#)
- 201612: Professor Liu was selected as one of the Ten "**Xin Rui**" Scholar of China 2016.
- 201608: Our research paper "Ultrafast growth of single-crystal graphene assisted by a continuous oxygen supply" was published on **Nature Nanotechnology**. [Link1](#) [Link2](#) [Link3](#) [Link4](#)
- 201606: Professor Liu was granted the **National Key R&D Plan** as a sub-project leader.
- 201508: Professor Liu was selected in "**NSFC Excellent Youth Scholar**" of China.



Highlights & News

Highlights:

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Optical fibres with 2D materials

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Network Electrodes by Single-Crystal Graphene Covering and Their Applications in Flexible Nanogenerator and Light-emitting Diode" was published on **Nano Energy**.

Year 2019

- 201911: Professor Liu was selected in "**Beijing Municipal Natural**

Research

Kaihui Liu's group has been long engaged in studying growth mechanism and spectral physics for low-dimensional materials. We independently designed the meter-scale single-crystal manufacturing equipment, built the single nano-object level in-situ optical characterization system and developed two-dimensional material composite fibers for all-fiber integration devices. We have made several important progresses, including (1) realizing surficial and interfacial engineering of the growth of 2D materials; (2) developing global methods of synthesizing meter-sized single-crystal films; (3) fabricating structure-dependent devices. Professor Liu has published more than 100 scientific journals, including correspondence-authored Nature (2), Nature Nanotechnology (2), Nature Photonics, Nature Chemistry, Nature Communications (4), Advanced Materials (10), JACS (2), Nano Letters (5), PNAS and Science Bulletin.

Current research interests

- (1) Surficial and interfacial engineering of the growth mechanism of 2D materials
- (2) Global technology of synthesizing meter-sized single-crystal films
- (3) Advanced nano-spectroscopy characterization techniques
- (4) Development of high-performance photoelectric detection and acoustic equipment

Position Opening

1-2 graduate students each year; 1-2 postdoc (for nano-structure and nano-spectroscopy)
independent research project for undergraduates.

Selected Publications

1. Yonggang Zuo[#], Wentao Yu[#], Can Liu[#], Xu Cheng, Ruixi Qiao, Jing Liang, Xu Zhou, Jinhuan Wang, Muhong Wu, Yun Zhao, Peng Gao, Shiwei Wu, Zhipei Sun, Kaihui Liu*, Xuedong Bai* and Zhongfan Liu*. "Optical fibres with embedded two-dimensional materials for ultrahigh nonlinearity", **Nature Nanotechnology** 2020, 15, 987 [Link1](#) [Link2](#) [Link3](#) [Highlight](#) [PDF](#) [PDF](#)
2. Jing Liang[#], Teng Tu[#], Guanchu Chen, Yuanwei Sun, Ruixi Qiao, He Ma, Wentao Yu, Xu Zhou, Chaojie Ma, Peng Gao*, Hailin Peng*, Kaihui Liu* and Dapeng Yu. "Unveiling the Fine Structural Distortion of Atomically Thin Bi2O2Se by Third-Harmonic Generation", **Advanced Materials** 2020, 32, 2002831 [PDF](#)
3. Muhong Wu[#], Zhibin Zhang[#], Xiaozhi Xu[#], Zhihong Zhang[#], Yunrui Duan, Jichen Dong, Ruixi Qiao, Sifan You, Li Wang, Jiajie Qi, Dingxin Zou, Nianze Shang, Yubo Yang, Hui Li, Lan Zhu, Junliang Sun, Haijun Yu, Peng Gao, Xuedong Bai, Ying Jiang, Zhu-Jun Wang, Feng Ding*, Dapeng Yu*, Enge Wang* and Kaihui Liu*. "Seeded growth of large single-crystal copper foils with high-index facets", **Nature** 2020, 581, 406 [Link1](#) [Link2](#) [Link3](#) [Link4](#) [Link5](#) [Link6](#) [Link7](#) [Link8](#) [Link9](#) [Link10](#) [Link11](#) [Highlight](#) [PDF](#)
4. Can Liu[#], Li Wang[#], Jiajie Qi[#] and Kaihui Liu*. "Designed Growth of Large-Size 2D Single Crystals", **Advanced Materials** 2020, 32, 2000046 [Link1](#) [Link2](#) [Link3](#) [Link4](#) [Link5](#) [Link6](#) [PDF](#)

5. Ke Chen[#], Xu Zhou[#], Xu Cheng[#], Ruixi Qiao, Yi Cheng, Can Liu, Yadian Xie, Wentao Yu, Fengrui Yao, Zhipei Sun, Feng Wang, Kaihui Liu* and Zhongfan Liu*. "Graphene photonic crystal fibre with strong and tunable light–matter interaction", **Nature Photonics** 2019, 13, 754 [Highlight Story](#) [Link1](#) [Link2](#) [Link3](#) [Link4](#) [PDF](#)
6. Can Liu[#], Xiaozhi Xu[#], Lu Qiu[#], Muhong Wu[#], Ruixi Qiao, Li Wang, Jinhuan Wang, Jingjing Niu, Jing Liang, Xu Zhou, Zhihong Zhang, Mi Peng, Peng Gao, Wenlong Wang, Xuedong Bai, Ding Ma, Ying Jiang, Xiaosong Wu, Dapeng Yu, Enge Wang, Jie Xiong*, Feng Ding* and Kaihui Liu*. "Kinetic modulation of graphene growth by fluorine through spatially confined decomposition of metal fluorides", **Nature Chemistry** 2019, 11, 730 [Link1](#) [Link2](#) [Link3](#) [Link4](#) [Link5](#) [Link6](#) [Link7](#) [PDF](#)
7. Li Wang[#], Xiaozhi Xu[#], Leining Zhang[#], Ruixi Qiao[#], Muhong Wu, Zhichang Wang, Shuai Zhang, Jing Liang, Zhihong Zhang, Zhibin Zhang, Wang Chen, Xuedong Xie, Junyu Zong, Yuwei Shan, Yi Guo, Marc Willinger, Hui Wu, Qunyang Li, Wenlong Wang, Peng Gao, Shiwei Wu, Yi Zhang, Ying Jiang, Dapeng Yu, Enge Wang, Xuedong Bai*, Zhu-Jun Wang*, Feng Ding* and Kaihui Liu*. "Epitaxial growth of a 100-square-centimetre single-crystal hexagonal boron nitride monolayer on copper", **Nature** 2019, 570, 91 [arXiv:1811.06688](#) [Link1](#) [Link2](#) [Link3](#) [Link4](#) [Link5](#) [Link6](#) [Link7](#) [Link8](#) [Link9](#) [Link10](#) [Link11](#) [Link12](#) [PDF](#)
8. Jing Liang[#], Jinhuan Wang, Zhihong Zhang, Yingze Su, Yi Guo, Ruixi Qiao, Peizhao Song, Peng Gao, Yun Zhao, Qingze Jiao, Shiwei Wu, Zhipei Sun, Dapeng Yu and Kaihui Liu*. "Universal Imaging of Full Strain Tensor in 2D Crystals with Third-Harmonic Generation", **Advanced Materials** 2019, 31, 1808160 [PDF](#)
9. Hao Hong[#], Jincan Zhang[#], Jin Zhang[#], Ruixi Qiao, Fengrui Yao, Yang Cheng, Chunchun Wu, Li Lin, Kaicheng Jia, Yicheng Zhao, Qing Zhao, Peng Gao, Jie Xiong, Kebin Shi, Dapeng Yu, Zhongfan Liu, Sheng Meng*, Hailin Peng* and Kaihui Liu*. "Ultrafast Broadband Charge Collection from Clean Graphene/CH₃NH₃PbI₃ Interface", **JACS** 2018, 140, 14952 [PDF](#)
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11. Jianbo Yin[#], Zhenjun Tan[#], Hao Hong[#], Jinxiang Wu[#], Hongtao Yuan, Yujing Liu, Cheng Chen, Congwei Tan, Fengrui Yao, Tianran Li, Yulin Chen, Zhongfan Liu, Kaihui Liu* and Hailin Peng*. "Ultrafast and highly sensitive infrared photodetectors based on two-dimensional oxyselenide crystals", **Nature Communications** 2018, 9, 3311 [Link1](#) [Link2](#) [Link3](#) [PDF](#)
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13. Xiaozhi Xu[#], Ding Yi[#], Zhichang Wang[#], Jiachen Yu[#], Zhihong Zhang, Ruixi Qiao, Zhanghao Sun, Zonghai Hu, Peng Gao, Hailin Peng, Zhongfan Liu, Dapeng Yu, Enge Wang, Ying Jiang*, Feng Ding* and Kaihui Liu*. "Greatly Enhanced Anticorrosion of Cu by Commensurate Graphene Coating", **Advanced Materials** 2018, 30, 1702944 [Link1](#) [Link2](#) [Link3](#) [Link4](#) [PDF](#)
14. Jing Liang[#], Jin Zhang[#], Zhenzhu Li[#], Hao Hong[#], Jinhuan Wang, Zhihong Zhang, Xu Zhou, Ruixi Qiao, Jiyu Xu, Peng Gao, Zhirong Liu, Zhongfan Liu, Zhipei Sun*, Sheng Meng*, Kaihui Liu* and Dapeng Yu. "Monitoring Local Strain Vector in Atomic-Layered MoSe₂ by Second-Harmonic Generation", **Nano Letters** 2017, 17, 7539 [Link1](#) [PDF](#)
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11. Yang Cheng[#], Hao Hong[#], Hui Zhao[#], Chunchun Wu, Yu Pan, Can Liu, Yonggang Zuo, Zhihong Zhang, Jin Xie, Jinhuan Wang, Dapeng Yu, Yu Ye, Sheng Meng and Kaihui Liu*. "Ultrafast Optical Modulation of Harmonic Generation in Two-Dimensional Materials", **Nano Letters** **2020**, **20**, **8053** [PDF](#)
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13. Zhibin Zhang[#], Jiajie Qi[#], Mengze Zhao, Nianze Shang, Yang Cheng, Ruixi Qiao, Zhihong Zhang, Mingchao Ding, Xingguang Li, Kehai Liu, Xiaozhi Xu, Kaihui Liu, Can Liu* and Muhong Wu*. "Scrolled Production of Large-Scale Continuous Graphene on Copper Foils", **Chinese Physics Letters** **2020**, **37**, **108101** [High Light](#) [PDF](#)
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19. Jing Liang[#], Teng Tu[#], Guanchu Chen, Yuanwei Sun, Ruixi Qiao, He Ma, Wentao Yu, Xu Zhou, Chaojie Ma, Peng Gao*, Hailin Peng*, Kaihui Liu* and Dapeng Yu. "Unveiling the Fine Structural Distortion of Atomically Thin Bi₂O₂Se by Third-Harmonic Generation", **Advanced Materials** **2020**, **32**, **2002831** [PDF](#)
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22. Muhong Wu[#], Zhibin Zhang[#], Xiaozhi Xu[#], Zhihong Zhang[#], Yunrui Duan, Jichen Dong, Ruixi Qiao, Sifan You, Li Wang, Jiajie Qi, Dingxin Zou, Nianze Shang, Yubo Yang, Hui Li, Lan Zhu, Junliang Sun, Haijun Yu, Peng Gao, Xuedong Bai, Ying Jiang, Zhu-Jun Wang, Feng Ding*, Dapeng Yu*, Enge Wang* and Kaihui Liu*. "Seeded growth of large single-crystal copper foils with high-index facets", **Nature** **2020**, **581**, 406 [Link1](#) [Link2](#) [Link3](#) [Link4](#) [Link5](#) [Link6](#) [Link7](#) [Link8](#) [Link9](#) [Link10](#) [Link11](#) [Highlight](#) [PDF](#)
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2017	Peking University Excellent Advisor Teacher in Undergraduate's Scientific Research
2017	Beijing Excellent Youth Professor
2017	Peking University "Huang tingfang/Xin He Excellent Youth Scholar"
2017	Champion in the third "Star of Nanotechnology"innovate business contest & technology-leading prize
2016	Ten "Xin Rui" Scholar of 2016
2016	Sub-project leader of National Key R&D Plan
2015	NSFC Excellent Youth Scholar
2009	First-Class Science & Technology Award of Beijing
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