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Graphene transmembrane nanofluidic devices: fabrication strategies and ion transport

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Curriculum vitae

Xiaofang Kang was born on October 20, 1994 (Chinese lunar calendar) in Lvliang, China. She grew up in Kangjialing, a village of Lvliang, and finished part of her primary education there. In 2005, she moved with her family to Lishi city, where she got her high school diploma in 2013. That same year, Xiaofang moved to Beijing to study Materials Science and Engineering at Beijing University of Technology, a top “211 project” university. She finished a research internship with Dr. Yusheng Ding and Prof. Kunyuan Gao, focusing on enhancing the corrosion resistance of aluminum alloys. After earning her bachelor’s degree in 2017, she joined the National Center for Nanoscience and Technology at the University of Chinese Academy of Sciences for her master’s research. Under Prof. Pu Xiong’s supervision, she studied nanomaterials and researched triboelectric nanogenerators, working to improve their performance.

In 2020, Xiaofang worked with Dr. Wangyang Fu on the DNA nucleobase sensor project at Tsinghua University. In 2021, she received a grant from the China scholarship council (No. 202107720043) to support her PhD studies. In mid-November 2021, she moved to Leiden, Netherlands, and joined in the research group of Dr. Grégory F Schneider in the department of Supramolecular & Biomaterials Chemistry at Leiden University to begin her PhD. Her research aims to enhance proton-selective transport using graphene as a transmembrane barrier and to explore the mechanisms of proton transport.

During her PhD, she collaborated with Prof. Dr. Zhongfan Liu, Dr. Luzhao Sun, and Dr. Buhang from the Beijing Graphene Institute (China) on single-crystalline graphene studies. She also worked with Prof. Dr. Xinliang Feng, Prof. Thomas Heine, Dr. Agnieszka Kuc, Dr. Minghao Yu, Dr. Zhiyong Wang, and colleagues from the Technical University Dresden (Germany) on ion transport in two-dimensional polymer membranes. In addition, she completed the courses ‘Scientific Conduct’ and ‘Academic Writing’.

Xiaofang has actively presented her research at various national and international workshops and conferences, including:

Chem2Dmat2021 (Online)

CHAINS 2022 (Eindhoven, Netherlands)

Single-Molecule Protein Sequencing 2022 (Delft, Netherlands)

Reedijk symposium 2023 (Leiden, Netherlands)

CHAINS 2023 (The Hague, Netherlands)

Graphene 2023 (Manchester, England, where her poster won first prize)

Graphene 2024 (Madrid, Spain)

Kroese-Duijsters Symposium 2024 (Leiden- Netherlands)

List of publications

- **X. Kang**, B. Chen, E.P. van Geest, W. Fu, J. Gao, L. Sun, Z. Liu, G.F. Schneider. Substrate-tight graphene transmembrane-nanofluidic devices. *Small* 2025, 2407140. (IF = 13)
- **X. Kang**, W. Fu, G.F. Schneider. Experimental strategies to fabricate mechanically exfoliated graphene sub-nanofluidic devices. *Carbon* 2025, 234, 120005. (IF = 11.6)
- **X. Kang**, C. Pan, Y. Chen, X. Pu. Boosting performances of triboelectric nanogenerators by optimizing dielectric properties and thickness of electrification layer. *RSC Adv* 2020, 10, 17752-17759. (IF = 4.6) (Citations > 170)
- Y. Long, Y. Chen, Y. Liu, G. Chen, W. Guo, **X. Kang**, X. Pu, W. Hu, Z. Wang. A flexible triboelectric nanogenerator based on a super-stretchable and self-healable hydrogel as the electrode. *Nanoscale* 2020, 12, 12753-12759. (IF = 5.8)
- J. Gao, Y. Huang, L. Bao, A. Jiao, Y. Li, S. Ao, H. Xue, **X. Kang**, G. Jiang, W. Gao, Z. Wang, X. Zhu, J. Liu, X. Zhang, C. Wan, G.F. Schneider, W. Fu. Quantum-capacitive activation of diazonium-functionalized graphene edges for reversible biosensing. Submitted to *Materials Today* 2025, under review.
- L. Bao, S. Ao, H. Xue, **X. Kang**, J. Gao, G.F. Schneider, L. Guo, M. Liu, W. Gao, Z. Zhang, E. Wang, S. Meng, W. Fu. Semiconducting detection of hydrogen isotopes tunneling through atom-thick 2D crystals. *In preparation*.
- **X. Kang**, W. Zhang, X. Liu, J. Gao, B. Chen, A. Jiao, M. Makurat, Q. Guo, M. Yu, L. Sun, W. Fu, A. Kuc, Z. Liu, X. Feng, T. Heine, G.F. Schneider. Sulfophenylation of graphene opens a transmembrane proton path. *In preparation*.
- **X. Kang**, A. Jiao, B. Chen, J. Gao, L. Sun, Z. Liu, W. Fu, G.F. Schneider. Functionalization of graphene nanopores by diazotization for monovalent ion sieving. *In preparation*.
- **X. Kang**, J. Gao, W. Fu, G.F. Schneider. Ultra-microtomy for the generation of graphene nanoribbons with tunable width and inter-edge spacing. *In preparation*.

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Xiaofang Kang

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