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Fabrication and biosensing with graphene edges

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List of publications

- **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. *Materials Today* 2026, 92, 387-395.
- H. Xue, W. Gao, **J. Gao**, G.F. Schneider, C. Wang, W. Fu. Radiofrequency sensing systems based on emerging two-dimensional materials and devices. *International Journal of Extreme Manufacturing* 2023, 5, 032010.
- 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.
- X. Zhu, R. Cui, D. Chen, Y. Li, X. Zhang, **J. Gao**, Y. Huang, J. Liu, H. Zhu, C. Wan, W. Fu. Protonation-gated hydrogen evolution enabled by pyridinic nitrogen on graphene edges. *Nano Letters* 2026, 26, 8692–8698.
- G. Jiang, Z. Wang, **J. Gao**, X. Feng, A. Kuc, T. Heine, W. Fu, G.F. Schneider. Dodecyl sulfate between graphene and Nafion increases the performance of a direct methanol fuel cell. *Nanoscale Under review*.
- **J. Gao**, A. Jiao, Y. Huang, L. Bao, Y. Li, H. Xue, X. Kang, G. Jiang, G.F. Schneider, W. Fu. Quantum capacitance at the edge of a graphene monolayer. *In preparation*.
- **J. Gao**, A. Jiao, L. Bao, H. Xue, X. Kang, G. Jiang, G.F. Schneider, W. Fu. Edge-dominant dielectrophoretic graphene nanoribbon transistors for attomolar miRNA detection. *In preparation*.
- **J. Gao**, N. Blümel, J. van Ruitenbeek, G.F. Schneider. Nucleotides identification in water using graphene tunneling junction. *In preparation*.

Curriculum vitae

Jianwei Gao was born in January 1996 in Weifang, China. From 2014 to 2018, he studied Petroleum Engineering at China University of Petroleum (east China), where he obtained his bachelor's degree at China University of Petroleum (east China) in Tsingdao, China. His bachelor thesis was on the "Dynamic analysis of reservoir development based on numerical simulation". In 2018, he was admitted through a postgraduate admission program to pursue graduate studies at Shandong University. During his master, he developed a strong interest in two-dimensional materials and nanoelectronics devices. His master's thesis, entitled "Graphene-based field-effect transistor biochemical sensors", was performed at Shandong University in Tsingdao, China. In 2021, he received his master degree in electronic science and technology also from Shandong University. Following his graduation, Jianwei received a CSC scholarship and joined the Leiden Institute of Chemistry at Leiden University, where he conducted research in the Supramolecular & Biomaterials Chemistry (SBC) group under the joined supervision of Professor Schneider, Professor Kros and Dr. Fu. During the first two years of his PhD program, he worked in the research group of Wangyang Fu, where he gained expertise in nanofabrication and biosensing. His research focused on graphene nanoribbon field-effect transistor biosensors and graphene edge-based sensing platforms.

Jianwei has actively presented his research at national and international workshops and conferences, including:

- **CHAINS 2022** Eindhoven, The Netherlands (Poster: J. Gao, Z. Wang, X. Kang, G. Jiang, W. Fu, G.F. Schneider. Graphene bridged polyaniline organic field effect transistor biosensor)
- **Single-Molecule Protein Sequencing 2022** Delft, The Netherlands (Poster: J. Gao, Z. Wang, X. Kang, G. Jiang, W. Fu, G.F. Schneider. Graphene bridged polyaniline organic field effect transistor biosensor)
- **15th Pacific Rim Conference on Ceramic and Glass Technology** Shenzhen, China (Poster: J. Gao, A. Jiao, L. Bao, H. Xue, X. Kang, G. Jiang, G.F. Schneider, W. Fu. Edge-dominant dielectrophoretic graphene nanoribbon transistors for attomolar miRNA detection)
- **Graphene 2024** Madrid, Spain (Contributing talk: 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, W. Fu, G.F. Schneider, Quantum-capacitive activation of diazonium-functionalized graphene edges for reversible biosensing)
- **Kroese-Duijsters Symposium 2024** Leiden, The Netherlands (Poster: 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, W. Fu, G.F. Schneider, Quantum-capacitive activation of diazonium-functionalized graphene edges for reversible biosensing)
- **CHAINS 2025** Eindhoven, The Netherlands (Poster: 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, W. Fu, G.F. Schneider, Quantum-capacitive activation of diazonium-functionalized graphene edges for reversible biosensing)

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I would like to express my sincere gratitude to my supervisor, Professor Grégory Schneider, for his outstanding guidance throughout my PhD. His patience, encouragement, and insightful advice have been invaluable at every stage of my research. Equally important was the freedom and trust he placed in me, allowing me to develop my own ideas, explore new directions, and grow into an independent researcher.

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Completing this dissertation marks the end of my PhD journey, but it is also the beginning of a new chapter in my life. Looking back, I realize that this work is far more than a collection of scientific results. It is a testament to the support, encouragement, trust, and love I have received from so many people along the way. To everyone who has been part of this journey, thank you for believing in me. I will carry your kindness with me as I move forward, both as a researcher and as a person.

Jianwei Gao
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