QIANG FENG, Ph.D.

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Department of Biomedical Engineering
Harold C. Simmons Comprehensive Cancer Center
University of Texas Southwestern Medical Center

SUMMARY OF CONTRIBUTIONS

My research centers on exploring the abundance and immunological functions of key metabolites in tumors. By designing multi-chromatic pH nanosensors with high spatial resolution, I uncovered the presence of severely polarized acidity (pHe<5.3) around tumor cells—more than one order of magnitude higher than previous understanding (Nature Biomed. Eng. 2024). By combining insights from cancer biology, clinical observations, and immune metabolism, I demonstrated that severe acidity is an underestimated immunosuppressor, while sodium lactate, as its anionic counterpart, plays a previously unrecognized immune-protective role (Nature Commun. 2022). I further led the development of multiple acidity-targeted immunotherapy nanodrugs and tumor metabolism-regulating immune adjuvants based on these findings. To date, I have published over 30 peer-reviewed papers in leading journals such as Nature Biomed. Eng. and Nature Commun., accumulating over 4,000 citations. I have also filed three patents for my discoveries. In addition to the scientific innovation, I have also mentored students from diverse backgrounds and will continue to train a diverse group of young scientists, providing them with the tools and mentorship to succeed in cancer research.

POSITIONS

Assistant Professor, University of Texas Southwestern Medical Center, Dallas, United States 2024 -

Research Scientist, University of Texas Southwestern Medical Center, Dallas, United States 2023 - 2024

EDUCATION AND TRAINING

Postdoctoral Fellow, University of Texas Southwestern Medical Center, Dallas, United States 2017 - 2023

Ph.D. in Nanoscience and Technology, National Center for Nano Science and Technology, Beijing, China 2014 - 2017
Thesis: Microfluidics-mediated Assembly of Functional Nanoparticles for Cancer-related Applications

M.S. in Pharmaceutics, Peking University, Beijing, China 2012 - 2014
Thesis: Surface Modified Core-shell Type Nanoparticles for The Co-delivery of Paclitaxel and SiRNA

B.S. in Pharmaceutical Sciences, Peking university, Beijing, China 2008 - 2012

RESEARCH EXPERIENCE

University of Texas Southwestern Medical Center, Dallas, United States 2017 -
Postdoctoral Fellow, Research Scientist, Assistant Professor Advisor: **Prof. Jinming Gao**

- Tumor Immune Metabolism: Delineated the spatial and functional heterogeneity of lactic acid
- Cytokine Therapy: Developed tumor-targeted cytokine therapy with large therapeutic window

National Center for Nanoscience and Technology, Beijing, China 2014 - 2017
Graduate Researcher Advisors: **Profs. Xingyu Jiang and Jiashu Sun**

- Microfluidics: Developed microfluidic chips for size-controlled fabrication of nanoparticles
- Bio-nano Interactions: Investigated the impact of nanoparticle structure on biological functionalities

Peking University, Beijing, China 2012 - 2014
Graduate Researcher Advisor: **Prof. Jiancheng Wang**

Drug delivery: Engineered liposomes for tumor targeted delivery of chemotherapy agents and siRNA

HONORS AND AWARDS

Young Investigator Award, *37th Society for Immunotherapy of Cancer Annual Meeting*	2022
Merit Student, *Chinese Academy of Sciences*	2016
Graduate Student Award, *Chinese Pharmaceutical Conference*	2015
Daewoong Scholarship, *Peking University*	2013
Daewoong Scholarship, *Peking University*	2011
ShuRen Scholarship, *Peking University*	2011
May Fourth Scholarship, *Peking University*	2009
Merit Student, *Peking University*	2009

SELECTED PUBLICATIONS

#Co-authors contributed equally

Feng, Q.; Bennett, Z.; Grichuk, A.; Pantoja, R.; Huang, T.; Faubert, B.; Huang, G.; Chen, M.; DeBerardinis, R. J.; Sumer, B. D.; Gao, J. Severely polarized extracellular acidity around tumour cells. *Nat. Biomed. Eng.* **2024**, *8*, 787.

Feng, Q.#; Liu, Z.#; Yu, X.#; Huang, T.; Chen, J.; Wang, J.; Wilhelm, J.; Li, S.; Song, J.; Li, W.; Sun, Z.; Sumer, B. D.; Li, B.; Fu, Y. X.; Gao, J. Lactate increases stemness of $CD8^+$ T cells to augment anti-tumor immunity. *Nat. Commun.* **2022**, *13*, 4981.

Huang, T.#; **Feng, Q.**#; Wang, Z.; Li, W.; Sun, Z.; Wilhelm, J.; Huang, G.; Vo, T.; Sumer, B. D.; Gao, J. Tumor-Targeted Inhibition of Monocarboxylate Transporter 1 Improves T-Cell Immunotherapy of Solid Tumors. *Adv. Healthcare Mater.* **2021**, *10*, e2000549.

Feng, Q.; Wilhelm, J.; Gao, J. Transistor-like Ultra-pH-Sensitive Polymeric Nanoparticles. *Acc. Chem. Res.* **2019**, *52*, 1485.

Feng, Q.#; Liu, J.#; Li, X.; Chen, Q.; Sun, J.; Shi, X.; Ding, B.; Yu, H.; Li, Y.; Jiang, X. One-Step Microfluidic Synthesis of Nanocomplex with Tunable Rigidity and Acid-Switchable Surface Charge for Overcoming Drug Resistance. *Small* **2017**, *13*, 1603109.

Zhang, L.#; **Feng, Q.**#; Wang, J.; Sun, J.; Shi, X.; Jiang, X. Microfluidic synthesis of rigid nanovesicles for hydrophilic reagents delivery. *Angew. Chem. Int. Ed.* **2015**, *54*, 3952.

OTHER PUBLICATIONS

#Co-authors contributed equally

Li, X.#; **Feng, Q.**#; Han, Z.#; Jiang, X. Enhancing Gene Editing Efficiency for Cells by CRISPR/Cas9 System-Loaded Multilayered Nanoparticles Assembled via Microfluidics. *Chin. J. Chem. Eng.* **2021,** *38*, 216.

Liu, C.#; **Feng, Q.** #; Sun, J. Lipid Nanovesicles by Microfluidics: Manipulation, Synthesis, and Drug Delivery. *Adv. Mater.* **2018**, e1804788.

Feng, Q.; Sun, J.; Jiang, X. Microfluidics-mediated assembly of functional nanoparticles for cancer-related pharmaceutical applications. *Nanoscale* **2016**, *8*, 12430.

Zhang, L.#; **Feng, Q.**#; Wang, J.; Zhang, S.; Ding, B.; Wei, Y.; Dong, M.; Ryu, J. Y.; Yoon, T. Y.; Shi, X.; Sun, J.; Jiang, X. Microfluidic Synthesis of Hybrid Nanoparticles with Controlled Lipid Layers: Understanding Flexibility-Regulated Cell-Nanoparticle Interaction. *ACS Nano* **2015**, *9*, 9912.

Feng, Q.#; Zhang, L.#; Liu, C.#; Li, X.; Hu, G.; Sun, J.; Jiang, X. Microfluidic based high throughput synthesis of lipid-polymer hybrid nanoparticles with tunable diameters. *Biomicrofluidics* **2015**, *9*, 052604.

Feng, Q.#; Yu, M. Z.#; Wang, J. C.; Hou, W. J.; Gao, L. Y.; Ma, X. F.; Pei, X. W.; Niu, Y. J.; Liu, X. Y.; Qiu, C.; Pang, W. H.; Du, L. L.; Zhang, Q. Synergistic inhibition of breast cancer by co-delivery of VEGF siRNA and paclitaxel via vapreotide-modified core-shell nanoparticles. *Biomaterials* **2014**, *35*, 5028.

Wang, M.; Bennett Z. T.; Singh, P,; **Feng, Q.**; Wilhelm, J.; Huang, G.; Gao, J.; Elucidation of Protonation Cooperativity of a STING-Activating Polymer. *Adv. Mater.* **2023**, 2305255.

Zi, Z.; Zhang, Z.; **Feng, Q.;** Kim, C.; Wang, X.D.; Scherer, P.E.; Gao, J.; Levine, B.; and Yu, Y.; Quantitative phosphoproteomic analyses identify STK11IP as a lysosome-specific substrate of mTORC1 that regulates lysosomal acidification. *Nat. Commun.* **2022,** *13*(1), 1760.

Chang, J.; Zhang, Y.; Li, Y.; Han, Z.; Tian, F.; Liu, C.; **Feng, Q.;** Wang, Y.; Sun, J.; Zhang, L. Multilayer Ratiometric Fluorescent Nanomachines for Imaging mRNA in Live Cells. *Small Methods* **2021**, *5*, e2001047.

Li, S.; Luo, M.; Wang, Z.; **Feng, Q.**; Wilhelm, J.; Wang, X.; Li, W.; Wang, J.; Cholka, A.; Fu, Y. X.; Sumer, B. D.; Yu, H.; Gao, J. Prolonged activation of innate immune pathways by a polyvalent STING agonist. *Nat. Biomed. Eng.* **2021**, *5(5)*, 455.

Bennett, Z. T.; **Feng, Q.;** Bishop, J. A.; Huang, G.; Sumer, B. D.; Gao, J. Detection of Lymph Node Metastases by Ultra-pH-Sensitive Polymeric Nanoparticles. *Theranostics* **2020**, *10*, 3340.

Li, X.; **Feng, Q.**; Jiang, X. Microfluidic Synthesis of Gd-Based Nanoparticles for Fast and Ultralong MRI Signals in the Solid Tumor. *Adv. Healthcare Mater.* **2019**, *8*, e1900672.

Tian, F.; **Feng, Q.**; Chen, Q.; Liu, C.; Li, T.; Sun, J. Manipulation of bio-micro/nanoparticles in non-Newtonian microflows. *Microfluid. Nanofluid.* **2019**, *23*, 68.

Liu, C.; Zhao, J.; Tian, F.; Cai, L.; Zhang, W.; **Feng, Q.**; Chang, J.; Wan, F.; Yang, Y.; Dai, B.; Cong, Y.; Ding, B.; Sun, J.; Tan, W. Low-cost thermophoretic profiling of extracellular-vesicle surface proteins for the early detection and classification of cancers. *Nat. Biomed. Eng.* **2019**, *3*, 183.

Tang, R.; Jia, Y.; Zheng, W.; **Feng, Q.**; Zheng, W.; Jiang, X. Nanocatalyst Complex Can Dephosphorylate Key Proteins in MAPK Pathway for Cancer Therapy. *Adv. Healthcare Mater.* **2018**, *7*, 1800533.

Sun, J.; Li, Y.; Yan, F.; Liu, C.; Sang, Y.; Tian, F.; **Feng, Q.**; Duan, P.; Zhang, L.; Shi, X.; Ding, B.; Liu, M. Control over the emerging chirality in supramolecular gels and solutions by chiral microvortices in milliseconds. *Nat. Commun.* **2018**, *9*, 2599.

Wang, P.; Zhang, L.; Zheng, W.; Cong, L.; Guo, Z.; Xie, Y.; Wang, L.; Tang, R.; **Feng, Q.**; Hamada, Y.; Gonda, K.; Hu, Z.; Wu, X.; Jiang, X. Thermo-triggered Release of CRISPR-Cas9 System by Lipid-Encapsulated Gold Nanoparticles for Tumor Therapy. *Angew. Chem. Int. Ed.* **2018**, *57*, 1491.

Zhang, L.; Tian, F.; Liu, C.; **Feng, Q.**; Ma, T.; Zhao, Z.; Li, T.; Jiang, X.; Sun, J. Hand-powered centrifugal microfluidic platform inspired by the spinning top for sample-to-answer diagnostics of nucleic acids. *Lab Chip* **2018**, *18*, 610.

Zhang, L.; Wang, P.; **Feng, Q.**; Wang, N.; Chen, Z.; Huang, Y.; Zheng, W.; Jiang, X. Lipid nanoparticle-mediated efficient delivery of CRISPR/Cas9 for tumor therapy. *Npg. Asia Mater.* **2017**, *9*, e441.

Zhang, L.; Ding, B.; Chen, Q.; **Feng, Q.**; Lin, L.; Sun, J. Point-of-care-testing of nucleic acids by microfluidics. *TrAC, Trends Anal. Chem.* **2017**, *94*, 106.

Lin, L.; Lin, X.; Lin, L.; **Feng, Q.**; Kitamori, T.; Lin, J. M.; Sun, J. Integrated Microfluidic Platform with Multiple Functions to Probe Tumor-Endothelial Cell Interaction. *Anal. Chem.* **2017**, *89*, 10037.

Lu, W.; Chen, Y.; Liu, Z.; Tang, W.; **Feng, Q.**; Sun, J.; Jiang, X. Quantitative Detection of MicroRNA in One Step via Next Generation Magnetic Relaxation Switch Sensing. *ACS Nano* **2016**, *10*, 6685.

Wang, S.; **Feng, Q.**; Sun, J.; Gao, F.; Fan, W.; Zhang, Z.; Li, X.; Jiang, X. Nanocrystalline Cellulose Improves the Biocompatibility and Reduces the Wear Debris of Ultrahigh Molecular Weight Polyethylene *via* Weak Binding. *ACS Nano* **2016**, *10*, 298.

Sun, J.; Zhang, L.; Wang, J.; **Feng, Q.**; Liu, D.; Yin, Q.; Xu, D.; Wei, Y.; Ding, B.; Shi, X.; Jiang, X. Tunable rigidity of (polymeric core)-(lipid shell) nanoparticles for regulated cellular uptake. *Adv. Mater.* **2015**, *27*, 1402.

Zhang, L.; Zhang, Y.; Wang, C.; **Feng, Q.**; Fan, F.; Zhang, G.; Kang, X.; Qin, X.; Sun, J.; Li, Y.; Jiang, X. Integrated microcapillary for sample-to-answer nucleic acid pretreatment, amplification, and detection. *Anal. Chem.* **2014**, *86*, 10461.

Gao, L. Y.; Liu, X. Y.; Chen, C. J.; Wang, J. C.; **Feng, Q.**; Yu, M. Z.; Ma, X. F.; Pei, X. W.; Niu, Y. J.; Qiu, C.; Pang, W. H.; Zhang, Q. Core-shell type lipid/rPAA-Chol polymer hybrid nanoparticles for *in vivo* siRNA delivery. *Biomaterials* **2014**, *35*, 2066.

Chen, C. J.; Wang, J. C.; Zhao, E. Y.; Gao, L. Y.; **Feng, Q.**; Liu, X. Y.; Zhao, Z. X.; Ma, X. F.; Hou, W. J.; Zhang, L. R.; Lu, W. L.; Zhang, Q. Self-assembly cationic nanoparticles based on cholesterol-grafted bioreducible poly(amidoamine) for siRNA delivery. *Biomaterials* **2013**, *34*, 5303.

Tao, X. M.; Wang, J. C.; Wang, J. B.; **Feng, Q.**; Gao, S. Y.; Zhang, L. R.; Zhang, Q. Enhanced anticancer activity of gemcitabine coupling with conjugated linoleic acid against human breast cancer *in vitro* and *in vivo*. *Eur. J. Pharm. Biopharm.* **2012**, *82*, 401.

Zhao, Z. X.; Gao, S. Y.; Wang, J. C.; Chen, C. J.; Zhao, E. Y.; Hou, W. J.; **Feng, Q.**; Gao, L. Y.; Liu, X. Y.; Zhang, L. R.; Zhang, Q. Self-assembly nanomicelles based on cationic mPEG-PLA-b-Polyarginine(R15) triblock copolymer for siRNA delivery. *Biomaterials* **2012**, *33*, 6793.

Zhao, E.; Zhao, Z.; Wang, J.; Yang, C.; Chen, C.; Gao, L.; **Feng, Q.**; Hou, W.; Gao, M.; Zhang, Q. Surface engineering of gold nanoparticles for *in vitro* siRNA delivery. *Nanoscale* **2012**, *4*, 5102.

PATENTS

A Microfluidic Chip and Method of Use Thereof in the Preparation of Nanocapsule, *CN104549585B*

pH Responsive Block Copolymer Compositions and Micelles that Inhibit MCT 1 and Related Protein, *US2021033857 9A1*

Ultra pH-sensitive Micelles Encapsulating Cytokines for Treatment of Cancer, *PCT/US2022/079899*

PRESENTATIONS/POSTERS

Oral Presentations

Immuno-oncology Translational Network Semi-Annual Meeting, *Gaithersburg, United States*	2023
37th Society of Immunotherapy of Cancer Annual Conference, *Boston, United States*	2022
International Conference of Microfluidics and Nanofluidics, *Dalian, China*	2016
Chinese Pharmaceutical Conference, *Hangzhou, China*	2015

Poster Presentation

Keystone Symposia Conference Single Cell Biology, *Breckenridge, United States*	2019
ChinaNano 2017, *Beijing, China*	2017
NanoDDS16, *Baltimore, United States*	2016
ChinaNano 2015, *Beijing, China*	2015
ChinaNanomedicine 2015, *Hangzhou, China*	2015

SERVICES

Reviewer:

ACS Applied Materials and Interface; Theranostics; Nanoscale; Trends in Analytical Chemistry; Journal of Material Sciences B; International Journal of Nanomedicine; Scientific Reports; RSC Advances; Electrophoresis; MedChemComm; Journal of Materials Science & Technology; Fibers and Polymers, Advanced Science, Molecular Cancer.

Guest editor:

Frontiers in Pharmacology special issue “Drug Discovery and Nano Delivery of Natural Products”