



Xiaowei Song

Physical Science Research Scientist, Chemistry

Bio

ACADEMIC APPOINTMENTS

- Physical Science Research Scientist, Chemistry

Publications

PUBLICATIONS

- **Biomolecular condensates mediate C-N bond formation** *NATURE CHEMICAL BIOLOGY*
Song, X., Ma, Y., Chen, M. W., Yu, W., Yan, X., Xu, J., Lyu, L., Hyman, A. A., Dai, Y., Zare, R. N.
2026
- **Biomolecular Condensates Power Nitrogen Cycling via Concurrent Redox Activities.** *Journal of the American Chemical Society*
Song, X., Lyu, L., Li, C., Ma, Y., Zhou, Y., Dai, Y., Zare, R. N.
2026
- **Dark Reactions in Microdroplets Explain Widespread Artifacts in Metabolomic Profiling** *ACS MEASUREMENT SCIENCE AU*
Song, X., Xu, J., Sun, C., Lyu, L., Kui, H., Zhang, R., Abliz, Z., Zare, R. N.
2026
- **Aqueous microdroplet chemistry enables sustainable, scalable synthesis of polyaniline** *MOLECULAR PHYSICS*
Jallow, J., Song, X., Basheer, C., Baig, U., Alaliwi, A., Bakdash, R. S., Zare, R. N.
2026
- **Comment on "An Alternative Explanation for Ions Put Forth as Evidence for Abundant Hydroxyl Radicals Formed Due to the Intrinsic Electric Field at the Surface of Water Droplets".** *Analytical chemistry*
Xu, J., Song, X., Lyu, L., Zhang, X., Zare, R. N.
2025
- **Intrinsic Electric Field Triggers Phenol Oxidative Degradation at Microbubble Interfaces.** *Journal of the American Chemical Society*
Xu, J., Song, X., Lu, Y., Lyu, L., Basheer, C., Zare, R. N.
2025
- **Spatial metabolomics atlas in the progression of oral squamous cell carcinoma.** *Journal of translational medicine*
Zhao, H., Han, W., Shi, C., Luo, G., Lu, W., Fu, Y., Hu, Q., Song, X., Shang, Z., Yang, X.
2025
- **Serum metabolomics reveals distinctive signature of cancer staging in oral squamous cell carcinoma.** *BMC oral health*
Lu, W., Liu, L., Li, J., Yang, H., Yang, Y., Hu, Q., Song, X., Liu, L., Yang, X.
2025; 25 (1): 1826
- **The air-water interfacial nitrogen cycle produces irrigatable-level ammonium nitrate** *CHEMICAL SCIENCE*
Song, X., Basheer, C., Xu, J., Zare, R. N.

2025

- **The air-water interfacial nitrogen cycle produces irrigatable-level ammonium nitrate.** *Chemical science*
Song, X., Basheer, C., Xu, J., Zare, R. N.
2025
- **Anion- π interaction-induced phase separation as a prebiotic pathway to oxygenation.** *Proceedings of the National Academy of Sciences of the United States of America*
Ren, X., Song, X., Lyu, L., Chen, M. W., Zare, R. N., Dai, Y.
2025; 122 (39): e2508804122
- **Microdroplet-Driven Synthesis of a Metal-Organic Framework Catalyst.** *Angewandte Chemie (International ed. in English)*
Song, X., Jallow, J., Basheer, C., Bakdash, R. S., Alaliwi, A., Alzamil, A. A., Zare, R. N.
2025: e202515006
- **Clarifying the Identity of the m/z 36 Ion in Water Microdroplet Mass Spectra.** *The journal of physical chemistry. A*
Song, X., Lyu, L., Xu, J., Xing, D., Zhang, X., Zare, R. N.
2025
- **Continuous Flow Contact Electrocatalysis for Hydrogen Peroxide Production** *JOURNAL OF PHYSICAL CHEMISTRY C*
Lee, K., Bose, S., Song, X., Choi, S. Q., Zare, R. N.
2025
- **Aging-dependent evolving electrochemical potentials of biomolecular condensates regulate their physicochemical activities.** *Nature chemistry*
Yu, W., Guo, X., Xia, Y., Ma, Y., Tong, Z., Yang, L., Song, X., Zare, R. N., Hong, G., Dai, Y.
2025
- **Transition-State-Dependent Spontaneous Generation of Reactive Oxygen Species by A β Assemblies Encodes a Self-Regulated Positive Feedback Loop for Aggregate Formation.** *Journal of the American Chemical Society*
Chen, M. W., Ren, X., Song, X., Qian, N., Ma, Y., Yu, W., Yang, L., Min, W., Zare, R. N., Dai, Y.
2025
- **Methane Bubbled Through Seawater Can be Converted to Methanol With High Efficiency.** *Advanced science (Weinheim, Baden-Wuerttemberg, Germany)*
Song, X., Basheer, C., Xu, J., Adam, M. M., Zare, R. N.
2025: e2412246
- **Onsite ammonia synthesis from water vapor and nitrogen in the air.** *Science advances*
Song, X., Basheer, C., Xu, J., Zare, R. N.
2024; 10 (50): eads4443
- **Wet-dry cycles cause nucleic acid monomers to polymerize into long chains.** *Proceedings of the National Academy of Sciences of the United States of America*
Song, X., Simonis, P., Deamer, D., Zare, R. N.
2024; 121 (49): e2412784121
- **Oxidation of Ammonia in Water Microdroplets Produces Nitrate and Molecular Hydrogen.** *Environmental science & technology*
Song, X., Basheer, C., Xia, Y., Zare, R. N.
2024
- **Biomolecular condensates can function as inherent catalysts.** *bioRxiv : the preprint server for biology*
Guo, X., Farag, M., Qian, N., Yu, X., Ni, A., Ma, Y., Yu, W., King, M. R., Liu, V., Lee, J., Zare, R. N., Min, W., Pappu, et al
2024
- **The power of microdroplet photochemistry.** *Chemical science*
Song, X., Zare, R. N.
2024; 15 (10): 3670-3672
- **Continuous ammonia synthesis from water and nitrogen via contact electrification.** *Proceedings of the National Academy of Sciences of the United States of America*

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- Li, J., Xia, Y., Song, X., Chen, B., Zare, R. N.
2024; 121 (4): e2318408121
- **Noninvasive Detection of Skin Cancer by Imprint Desorption Electrospray Ionization Mass Spectrometry Imaging.** *Analytical chemistry*
Meng, Y., Chiou, A. S., Aasi, S. Z., See, N. A., Song, X., Zare, R. N.
2023
 - **Water Microdroplets-Initiated Methane Oxidation.** *Journal of the American Chemical Society*
Song, X., Basheer, C., Zare, R. N.
2023
 - **One-step Formation of Urea from Carbon Dioxide and Nitrogen Using Water Microdroplets.** *Journal of the American Chemical Society*
Song, X., Basheer, C., Xia, Y., Li, J., Abdulazeez, I., Al-Saadi, A. A., Mofidfar, M., Suliman, M. A., Zare, R. N.
2023
 - **Making ammonia from nitrogen and water microdroplets.** *Proceedings of the National Academy of Sciences of the United States of America*
Song, X., Basheer, C., Zare, R. N.
2023; 120 (16): e2301206120
 - **Silicone Wristband Spray Ionization Mass Spectrometry for Combined Exposome and Metabolome Profiling** *ISRAEL JOURNAL OF CHEMISTRY*
Mofidfar, M., Song, X., Kelly, J. T. T., Rubenstein, M. H. H., Zare, R. N. N.
2023
 - **Immuno-Desorption Electrospray Ionization Mass Spectrometry Imaging Identifies Functional Macromolecules by Using Microdroplet-Cleavable Mass Tags.** *Angewandte Chemie (International ed. in English)*
Song, X., Zang, Q., Li, C., Zhou, T., Zare, R. N.
2023
 - **Reply to Brzeski and Jordan: Potential pyridine tautomers that can form stable dipole-bound anions.** *Proceedings of the National Academy of Sciences of the United States of America*
Zhao, L., Song, X., Gong, C., Zhang, D., Wang, R., Zare, R. N., Zhang, X.
2022; 119 (38): e2212433119
 - **Spraying Water Microdroplets Containing 1,2,3-Triazole Converts Carbon Dioxide into Formic Acid.** *Journal of the American Chemical Society*
Song, X., Meng, Y., Zare, R. N.
2022
 - **Laser Ablation Electrospray Ionization Achieves 5 μm Resolution Using a Microlensed Fiber.** *Analytical chemistry*
Meng, Y., Song, X., Zare, R. N.
2022
 - **Capture of Hydroxyl Radicals by Hydronium Cations in Water Microdroplets.** *Angewandte Chemie (International ed. in English)*
Xing, D., Meng, Y., Yuan, X., Jin, S., Song, X., Zare, R. N., Zhang, X.
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 - **Sprayed water microdroplets containing dissolved pyridine spontaneously generate pyridyl anions.** *Proceedings of the National Academy of Sciences of the United States of America*
Zhao, L., Song, X., Gong, C., Zhang, D., Wang, R., Zare, R. N., Zhang, X.
2022; 119 (12): e2200991119
 - **Hydrogen-Deuterium Exchange Desorption Electrospray Ionization Mass Spectrometry Visualizes an Acidic Tumor Microenvironment.** *Analytical chemistry*
Song, X., Zang, Q., Zare, R. N.
2021
 - **Distinguishing between Isobaric Ions Using Microdroplet Hydrogen–Deuterium Exchange Mass Spectrometry** *Metabolites*
Song, X., Li, J., Mofidfar, M., Zare, R. N.
2021
 - **In situ DESI-MSI lipidomic profiles of mucosal margin of oral squamous cell carcinoma.** *EBioMedicine*

Yang, X., Song, X., Zhang, X., Shankar, V., Wang, S., Yang, Y., Chen, S., Zhang, L., Ni, Y., Zare, R. N., Hu, Q.
2021; 70: 103529

- **Big cohort metabolomic profiling of serum for oral squamous cell carcinoma screening and diagnosis** *Natural Sciences*
Yang, X., Song, X., Yang, X., Han, W., Fu, Y., Wang, S., Zhong, X., Lu, Y., Sun, G., Wang, Z., Ni, Y., Zare, R. N., Hu, et al
2021; 1 (1)
- **Introducing Nafion for In Situ Desalting and Biofluid Profiling in Spray Mass Spectrometry.** *Frontiers in chemistry*
Song, X., Mofidfar, M., Zare, R. N.
2021; 9: 807244
- **Coulometry-assisted quantitation in spray ionization mass spectrometry.** *Journal of mass spectrometry : JMS*
Song, X., Chen, H., Zare, R. N.
2020: e4628
- **Oral squamous cell carcinoma diagnosed from saliva metabolic profiling.** *Proceedings of the National Academy of Sciences of the United States of America*
Song, X., Yang, X., Narayanan, R., Shankar, V., Ethiraj, S., Wang, X., Duan, N., Ni, Y., Hu, Q., Zare, R. N.
2020
- **Conductive Polymer Spray Ionization Mass Spectrometry for Biofluid Analysis** *ANALYTICAL CHEMISTRY*
Song, X., Chen, H., Zare, R. N.
2018; 90 (21): 12878-12885