



谢炎

广东工业大学生态环境与海洋学院副教授

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基本信息

谢炎，中国石油大学（北京）博士，广东工业大学“青年百人计划”A 类引进人才。主要从事海洋可燃冰开发及其生态环境效应、深海甲烷渗漏的“源-汇”机制及环境效应、二氧化碳海底封存、海洋原位探测-采样-长周期室内模拟装备技术等方向研究。

主持中国科学院南海海洋研究所冷泉生态系统研究装置国家重大科技基础设施项目-冷泉沉积环境及流体活动实验分系统、国家自然科学基金青年科学基金项目、广东省海洋经济发展重点项目课题、广东省基础与应用基础研究基金面上项目等国家及省部级项目多项；作为核心骨干参与国家自然科学基金国家重大科研仪器研制项目、国家重点研发计划项目等国家重大项目多项。

在 Nature Communications、Science Bulletin、Renewable & Sustainable Energy Reviews 等高水平期刊发表学术论文 40 余篇，获 ESI 高被引论文 1 篇；申请中国发明

专利 40 余项，其中授权中国发明专利 18 项，申请美国发明专利 8 项、国际 PCT 专利 1 项。担任 Renewable & Sustainable Energy Reviews、Chemical Engineering Journal、Fuel、Petroleum Science 等国内外学术期刊审稿人。

在我国海洋科考中多次担任航次首席科学家，其中 1 次担任国家自然科学基金共享航次计划重大科学考察航次负责人。参与研究团队“升”级多序列保真采水-多级过滤长周期培养一体化装置、深海多序列多功能沉积物保压采样装置、深海冷泉发育模拟装置、三维可燃冰开采甲烷泄漏模拟实验系统等多套深海原位探测、采样及深海原位环境模拟装备的研制与应用。

研究方向

海洋可燃冰开发及其生态环境效应、深海甲烷渗漏的“源-汇”机制及环境效应、二氧化碳海底封存、海洋原位探测-采样-长周期室内模拟装备技术

工作经历

2024.03-至今，广东工业大学生态环境与海洋学院，副教授

2021.11-2024.03，广东工业大学生态环境与资源学院，博士后

科研项目

1. 中国科学院南海海洋研究所，中国科学院南海海洋研究所冷泉生态系统研究装置国家重大科技基础设施项目-冷泉沉积环境及流体活动实验分系统，2025.03-2029.06，247.6 万元，项目负责人

2. 广东省自然资源厅, 广东省 2023 年海洋经济发展 (海洋六大产业) 重点项目, 冷泉环境智能采样装置研究及应用, 2023.02-2025.01, 1250 万元, 课题负责人
3. 科学技术部国际科技合作中心, 国家重点研发计划“战略性科技创新合作”重点专项, 全球深海冷泉生态系统保护和利用合作研究, 2026.01-2028.12, 700 万元, 任务负责人
4. 国家自然科学基金委员会, 青年科学基金项目 (C 类), 南海神狐海域环境小分子 H_2/N_2 强化 CH_4-CO_2 水合物置换机理研究, 2023.01-2025.12, 30 万元, 项目负责人
5. 中国博士后科学基金会, 中国博士后科学基金会上项目, 基于水合物微观形貌调控强化神狐海域环境 CH_4-CO_2/H_2 水合物置换方法研究, 2022.06-2023.12, 项目负责人
6. 广东省基础与应用基础研究基金委员会, 面上项目, “海马”冷泉区泄漏甲烷气泡在水体环境中的水合物转化及甲烷传质特性, 2023.01-2025.12, 项目负责人
7. 广州市科学技术局, 广州市基础与应用基础研究专题, “海马”冷泉环境泄漏甲烷气泡的水合物转化-甲烷传质耦合特性研究, 2025.01-2026.12, 项目负责人
8. 国家发展和改革委员会, 国家重大科技基础设施建设项目, 冷泉生态系统研究装置, 2024-2029, 参与
9. 国家自然科学基金委员会, 国家重大科研仪器研制项目, 深海甲烷渗漏区多介质环境保真取样与多场模拟装置, 2023.01-2027.12, 706 万元, 核心骨干, 项目秘书
9. 中华人民共和国科学技术部, 国家重点研发计划青年科学家项目, 天然气水合物上覆沉积层-水环境甲烷转化与固碳机制, 2021.12-2026.11, 350 万元, 核心骨干
10. 广东省自然资源厅, 广东省海洋六大产业专项, 可燃冰开采甲烷泄漏的环境影响机制及评价技术, 2022.04-2024-03, 500 万元, 核心骨干, 项目秘书

11. 广东省高等学校基础研究卓越中心团队项目，南海冷泉资源开发及生态安全风险
评估，2024.08-2027.12，500 万元，核心骨干，项目秘书
12. 中国工程院&国家自然科学基金委联合战略研究与咨询项目课题，海洋开发环保
安全技术发展战略研究，2021-2022，核心骨干，项目秘书

代表性论文

1. **Yan Xie**, Jingchun Feng*, Xingyu Chen, Junwen Wang, Longhang Xu, Zhenwu Zhou, Bin Wang, Yi Wang, Si Zhang, Zhifeng Yang. CH₄ hydrate dissociation and CH₄ leakage characteristics: Insights from laboratory investigation based on stratified environment reconstruction of natural gas hydrate reservoir. *Renewable & Sustainable Energy Reviews*. 2024, 206:114891.
2. **Yan Xie**, Tao Zheng, Yujie Zhu, Changyu Sun*, Guangjin Chen*, Jingchun Feng. H₂ Promotes the Premature Replacement of CH₄-CO₂ Hydrate even when the CH₄ Gas-Phase Pressure Surpasses the Phase Equilibrium Pressure of CH₄ Hydrate. *Renewable & Sustainable Energy Reviews*. 2024, 200: 114582.
3. **Yan Xie**, Jingchun Feng*, Longhang Xu, Xingyu Chen, Junwen Wang, Fei Peng, et al. Optimizing the depressurization rate to balance CH₄ hydrate dissociation and CH₄ leakage in unconfined marine hydrate reservoirs. *Fuel*. 2027, 427: 139559.
4. **Yan Xie**, Yujie Zhu, Tao Zheng, Hua Pan, Changyu Sun*, Jingchun Feng*, Xingyu Chen, Longhang Xu, Bin Wang, Guangjin Chen*. Increase in Subcooling Elevates the SDS Concentration Threshold for Significantly Promoting CH₄ and CO₂ Hydrate Formation. *Industrial & Engineering Chemistry Research*. 2025, 64.

5. **Yan Xie.**, Yanyan Huang, Jingchun Feng, Guozhong Wu, Zhijie Xu, Zhen Zhang, Yi Wang, Zhenwu Zhou, Bin Wang, Si Zhang, Zhifeng Yang. Experimental and modeling investigations on CH₄ hydrate phase equilibria in multi-ion "Haima" cold seep environment. ***Gas Science and Engineering***. 2024: 205362.
6. **Yan Xie**, Liwei Cheng, Jingchun Feng*, Tao Zheng, Yujie Zhu, Xinyang Zeng, Changyu Sun*, Guangjin Chen*. Kinetics behaviors of CH₄ hydrate formation in porous sediments: non-unidirectional influence of sediment particle size on hydrate formation. ***Energy***. 2023: 130021.
7. **Yan Xie**, Tao Zheng, Yujie Zhu, Jinrong Zhong, Jingchun Feng, Changyu Sun*, Guangjin Chen*. Effects of H₂/N₂ on CO₂ hydrate film growth: Morphology and microstructure. ***Chemical Engineering Journal***. 2022, 431: 134004.
8. **Yan Xie**, Yujie Zhu, Liwei Cheng, Tao Zheng, Jinrong Zhong, Peng Xiao*, Changyu Sun*, Guangjin Chen, Jingchun Feng*. The coexistence of multiple hydrates triggered by varied H₂ molecule occupancy during CO₂/H₂ hydrate dissociation. ***Energy***. 2022, 262: 125461.
9. **Yan Xie**, Jingchun Feng*, Weiqiang Hu, Mingrui Zhang, Junwen Wang, Bo Peng, Yujun Wang, Zhenwu Zhou, Yi Wang. Deep-Sea Sediment and Water Simulator for Investigation of Methane Seeping and Hydrate Formation. ***Journal of Marine Science and Engineering***. 2022, 10(4): 514.
10. **Yan Xie**, Jingchun Feng*, Liwei Sun, Junwen Wang, Weiqiang Hu, Bo Peng, Yujun Wang, Yi Wang. Coupled Simulation of Hydrate-Bearing and Overburden Sedimentary Layers to Study Hydrate Dissociation and Methane Leakage. ***Journal of Marine Science and Engineering***. 2022, 10(5): 668.
11. **Yan Xie**, Yujie Zhu, Tao Zheng, Qing Yuan, Changyu Sun*, Lanying Yang, Guangjin Chen*. Replacement in CH₄-CO₂ hydrate below freezing point based on abnormal self-preservation differences of CH₄ hydrate. ***Chemical Engineering Journal***. 2021, 403: 126283.
12. **Yan Xie**, Tao Zheng, Jinrong Zhong, Yujie Zhu, Yunfei Wang, Yu Zhang, Rui Li, Qing Yuan, Changyu Sun*, Guangjin Chen*. Experimental research on self-preservation effect of methane hydrate in porous sediments. ***Applied Energy***. 2020, 268: 115008.

13. **Yan Xie**, Rui Li, Xiaohui Wang*, Tao Zheng, Jinlong Cui, Qing Yuan, Huibo Qin, Changyu Sun*, Guangjin Chen*. Review on the accumulation behavior of natural gas hydrates in porous sediments. *Journal of Natural Gas Science and Engineering*. 2020, 83: 103520.
14. 朱玉洁¹, 谢炎¹(共同一作), 钟瑾荣, 孙长宇*, 陈光进, 王晓辉. 量热法多孔沉积物内 CH₄ 水合物生成过程中的放热行为. *化工进展*. 2020, 40(10): 5506-5513. (EI)
15. Bin Wang, Xiao Chen, **Yan Xie**, Pengfei Wang, Jingchun Feng*, Si Zhang. Hydrate formation in porous media with upward-migrating methane and its implications for the evolution of deep-sea cold seep ecosystems. *Science of The Total Environment*. 2025, 959: 178299.
16. Xingyu Chen, Jingchun Feng*, **Yan Xie**, Longhang Xu, Yi Wang, Bin Wang, Si Zhang, Zhifeng Yang. Methane Hydrate Formation Kinetics in Varied Sediment of Deep-Sea Cold Seep Environment. *Energy & Fuels*, 2025, 39: 3954-3965.
17. Zhen Zhang, Jingchun Feng*, Yue Zhang, Bin Wang, **Yan Xie**, Zhifeng Yang, Si Zhang. Montmorillonite-Mediated Formation Kinetics of Methane Hydrate in Sandy-Clay Sediments: Inhibition or Promotion?. *Energy & Fuels*, 2025, 39: 4693-4705.
18. Zhenwu Zhou, Jingchun Feng, Xinyang Zeng, **Yan Xie**, Bin Wang, Si Zhang, Zhifeng Yang, Yi Wang. Revealing the kinetic behaviors of hydrate formation on bubble surface with different pressure gradients in deep-sea methane seepage areas of the South China Sea. *Energy*, 2024, 308: 132808.
19. Junwen Wang, Jingchun Feng*, **Yan Xie**, Zhenwu Zhou, Xingyu Chen, Longhang Xu, Bin Wang, Yi Wang, Si Zhang, Zhifeng Yang. Hydrate Formation and Methane Mass Transfer Characteristics in Static Systems of Pure Water and Saline Water with Varied Initial Dissolved Methane Concentrations. *Energy & Fuels*. 2024, 38(11): 9486-9496.
20. Zhenwu Zhou, Jingchun Feng, **Yan Xie**, Bin Wang, Yi Wang, Si Zhang, Zhifeng Yang. Effects of Salinity on the Macroscopic and Microscopic Evolution Characteristics of Methane Hydrate Films on Bubble Surfaces. *Energy & Fuels*. 2024, 38(12): 10945-10954.

21. Yujie Zhu, Yuzhou Chen, **Yan Xie**, Jinrong Zhong, Xiaohui Wang*, Peng Xiao, Yifei Sun, Changyu Sun*, Guangjin Chen. Microscopic experimental study on the effects of NaCl concentration on the self-preservation effect of methane hydrates under 268.15 K. **Chinese Journal of Chemical Engineering**, 2024, 73(09):1-14.
22. Jingchun Feng, **Yan Xie**, Li Tang, Pian Li, Zhenwu Zhou, Si Zhang*, Zhifeng Yang, Yi Wang*. Hydrate formation significantly decreases the uplifting rate of methane bubble from the seafloor to the upper water column. **Science Bulletin**, 2023, 68(24): 3149-3153.
23. Jingchun Feng, Li Tang, **Yan Xie**, Weiyu Yuan, Si Zhang*, Jinyue Yan, Fei Chai, Xiaosen Li, Zhifeng Yang*, Yi Wang. Offshore carbon sequestration: Renewable energy and multi-carbon transformations prompt greener future. **The Innovation Geoscience**, 2023.
24. Peng Xiao, Juanjuan Li, Wan Chen, WeiXin Pang, Xiaowan Peng, **Yan Xie**, Xiaohui Wang, Chun Deng, Changyu Sun*, Bei Liu, Yujie Zhu, Yunlei Peng, Praveen Linga*, Guangjin Chen*. Enhanced formation of methane hydrate from active ice with high gas uptake. **Nature Communications**, 2023, 14(1): 8068.
25. Yujie Zhu, **Yan Xie**, Jinrong Zhong, Yijian Zhu, Xiaohui Wang, Peng Xiao, Yifei Sun, Xingxun Li, Changyu Sun*, Guangjin Chen*. In Situ Investigation on the Morphology and Formation Kinetics of a CO₂/N₂ Mixed Hydrate Film. **ACS Sustainable Chemistry & Engineering**, 2023, 11(12): 4678-4689.
26. Xinyang Zeng, Jingchun Feng*, Wei Ke*, Jiang Wang, Si Zhang, **Yan Xie**. Film formation kinetics of Methane-propane hydrate on gas bubble in MEG and luvicap EG solutions. **Applied Energy**, 2023, 330: 120301.
27. Yujie Zhu, **Yan Xie**, Jinrong Zhong, Xiaohui Wang, Peng Xiao, Changyu Sun*, Guangjin Chen*. Mini Review on Application and Outlook of In Situ Raman Spectrometry in Gas Hydrate Research. **Energy & Fuels**, 2022, 36(18): 10430-10443.
28. Jinrong Zhong, Yifei Sun, **Yan Xie**, Yujie Zhu, Changyu Sun, Guangjin Chen*, Yuefei Zhang*. CO₂ Hydrate dissolution rates in unsaturated water quantified with laboratory experiments. **Chemical Engineering Journal**, 2022, 430: 133137.

29. Yanyan Huang, Jingchun Feng*, **Yan Xie**, Yi Wang, Pian Li, Mingrui Zhang. Phase equilibrium characteristics of natural gas hydrate formation at the deep-water environment of “Haima” cold seep. *Energy Reports*, 2022, 8: 5501-5509.
30. Lantao Geng, Jin Cai, Cheng Lu*, Xuwen Qin*, Rongrong Qi, Fanle Meng, **Yan Xie**, Zhibin Sha, Xiaohui Wang, Changyu Sun*. Phase equilibria of natural gas hydrates in bulk brine and marine sediments from the South China Sea. *Journal of Chemical & Engineering Data*, 2021, 66(11): 4064-4074.
31. Jinrong Zhong, Yifei Sun, **Yan Xie**, Changyu Sun, Guangjin Chen*, Wei Yan. Effect of N₂/H₂ injection on CH₄ hydrate decomposition. *Chemical Engineering Journal*, 2020, 396: 125266.
32. Jinrong Zhong, Yifei Sun, Wenzhi Li, **Yan Xie**, Guangjin Chen*, Changyu Sun*, Lanying Yang, Huibo Qin, Weixin Pang, Qingping Li. Structural transition range of methane-ethane gas hydrates during decomposition below ice point. *Applied Energy*, 2019, 250: 873-881.
33. Xiaohui Wang, Yunfei Wang, **Yan Xie**, Changyu Sun*, Guangjin Chen*. Study on the decomposition conditions of gas hydrate in quartz sand-brine mixture systems. *The Journal of Chemical Thermodynamics*, 2019, 131: 247-253.

联系方式

课题组主要从事海洋甲烷释放及冷泉生态系统发育演化、海洋天然气水合物、海洋固碳、海洋碳循环、海洋新型污染物、海洋装备等方向研究，长期招收具有生物、生态、环境、能源、机械装备等相关专业背景的研究生和博士后。

诚邀您同我们一起出海远航、探索海洋！

<https://www.gdut.edu.cn/info/1709/23292.htm>

<https://www.gdut.edu.cn/info/>

1709/16446.htm

滨海与深海生态环境研究中心：

<https://zhuanlan.zhihu.com/p/672354786>

<https://seer.gdut.edu.cn/info/1045/1110.htm>