



应用胶体与界面化学



团队负责人：刘雪峰 教授/博导

团队成员：张永民 副教授/硕导，樊晔 副教授/硕导

一、研究领域 / Research Fields

1. 应用胶体与界面化学
2. 新型表面活性剂分子设计、合成、智能组装及应用研究
3. 新型化妆品及功效成分的制备、包装
4. 油田化学

二、研究内容 / Research Contents

1. 绿色油脂表面活性剂的合成与工业化
2. 特殊功能型表面活性剂的设计与合成
3. 环境刺激响应型胶体体系的构筑与调控
4. 天然饱和脂肪酸酯体系及其在化妆品功能递送中的应用
5. 天然聚合物的改性及其在环境修复中的胶体与界面化学
6. 水凝胶的自调控及其在油田封堵、调剖、压裂中的应用
7. 化妆品功效成分的软性界面递送技术

三、代表性成果 / Representative Achievements

1. 项目
 - 1) 国家重点研发计划课题“高效高值表面活性剂的研究开发及应用示范” (2017YFB0305000)
 - 2) 国家重点研发计划课题“脂肪酸囊泡的原料生产技术开发” (2017YFB03087005)
 - 3) 国家自然科学基金：可逆调控Krafft温度自SESW后胶束溶液同步回收表面活性剂和增溶物的构效关系 (22272002)
 - 4) 国家自然科学基金面上项目：多重刺激响应型无表面活性剂离子液微滴的构筑、智能调控及应用 (220720058)
 - 5) 国家自然科学基金：智能开关微乳及其清洗/回收矿物油的构效关系 (21673103)
 - 6) 国家自然科学基金：非球状纳米结构阵列型SERS基底及其构效关系研究
 - 7) 国家自然科学基金青年基金项目：基于刺激响应性脂肪酸囊泡的新型Pickering乳液的研究 (21606107)
 - 8) 国家自然科学基金青年基金项目：基于含磺功能分子的氧化—还原开关闭型虫状胶束的构筑及性能研究 (21503094)
 - 9) 江苏省自然科学基金项目：氧化—还原响应型含磺双表面活性剂的合成及自组装研究 (BK20150128)
 - 10) 江苏省教育厅：特种表面活性剂分子设计与制造

2. 获奖

- 1) 中国轻工业联合会科技发明二等奖 (2022)
- 2) 中国轻工业联合会科技进步三等奖 (2017)
- 3) 江苏省科学技术三等奖 (2011)
- 4) 江苏省高等学校重点教材 (2021)
- 5) 莱智奖奖金获得者 (2014, 刘雪峰)
- 6) 江南大学教学成果二等奖 (2017)
- 7) 全国大学生化学实验创新设计大赛一等奖指导教师 (2022, 樊晔/张永民)
- 8) 江南大学本科优秀毕业设计(论文)指导教师 (2017/2019)
- 9) 江南大学青年教师教学会讲三等奖 (2016/2018)

4. 论文

- 1) Jiajie Pan, Lianlian Sun, Xuefeng Liu*, Yunjun Fang. Precipitation-Dissolution Switchable Surfactants with the Potential of Simultaneous Retrieving of Surfactants and Hydrophobic Organic Contaminants from Emulsified and Micellar Eluents. *Chem. Eng. J.*, 2023, 458, 141297
- 2) Shanjuan Zhao, Huan Xie, Xutao Tang, Guoqing Lu, Yongmin Zhang*. Oxidized dextran-crosslinked ferrocene-chitosan-PEI composite porous material integrating adsorption and degradation to malachite green. *Carbohydr. Polym.*, 2023, 312, 122770
- 3) Yongmin Zhang*, Meng Mu, Yue Zhou, Huan Xie, Shanjuan Zhao. Redox-responsive microemulsion: Fabrication and application to curcumin encapsulation. *J. Colloid Interface Sci.*, 2023, 647, 384-394
- 4) Ruiqin Feng, Miaoqian Chen, Yun Fang*, Ye Fan and Yongmei Xia*, Supramolecular interactions in the pseudo-polyanions of poly(vinylpyrrolidone) complexed with various anionic surfactants. *Colloids Surfaces A: Physicochem. Eng. Aspects*, 2023, 671, 131585
- 5) Ruiqin Feng, Ye Fan, Yun Fang* and Yongmei Xia*, Morphological effects of Au nanoparticles on electrochemical sensing platforms for nitrite detection. *Molecules*, 2023, 28, 4934
- 6) Yongmin Zhang*, Shanjuan Zhao, Meng Mu, Lushan Wang, Ye Fan and Xuefeng Liu. Eco-friendly ferrocene-functionalized chitosan aerogel for efficiently degrading dye and adsorbing phosphate from wastewater. *Chem. Eng. J.*, 2022, 439, 135605
- 7) 樊晔, 曹崇梅, 方云*, 夏咏梅. 自交联共轭亚油酸囊泡荧光纳米点的构筑及其荧光特性. *物理化学学报*, 2022, 38(3): 2002202
- 8) Huan Li, Xuefeng Liu*. Rational design of dynamic imine surfactants for oil-water emulsions: Learning from oil-induced reversible dynamic imine bond formation. *J. Colloid Interface Sci.*, 2022, 607, 163-170
- 9) Yongmin Zhang*, Meng Mu, Zhe Yang, Xiaochen Liu. Ultralong-Chain Ionic Liquid Surfactants Derived from Natural Erucic Acid. *ACS Sustainable Chem. Eng.*, 2022, 10(7), 2545-2555
- 10) Hong Wang, Xinyu Zhang, Yun Fang*, Ye Fan, Ei San Khin Nyein. Smart and recyclable admicelle-coated Fe3O4 nanoparticles for treating oily wastewater. *J. Environmental Chem. Eng.*, 2022, 10, 107445
- 11) Lei Li, Yun Fang*, Yongmei Xia, Chunling Bo, Ye Fan. Monosaccharides driving the formation of conjugated linoleic acid vesicles in near-neutral solutions via weak noncovalent bonding interactions. *J. Mol. Liq.*, 2022, 351, 118656
- 12) Shuyi Wang, Shuang Cai, Xuefeng Liu*, Yongmin Zhang, Yun Fang. Reversible CO2/N2-tuning Krafft temperature of sodium alkyl sulphonates and a proof-of-concept using in surfactant-enhanced soil washing. *Chem. Eng. J.*, 2021, 417, 129316
- 13) Zhe Yang, Shuai He, Yinjun Fang, Yongmin Zhang*. Viscoelastic fluid formed by ultra-long-chain erucic acid-base ionic liquid surfactant responds to acid/alkaline, CO2 and light. *J. Agric. Food Chem.*, 2021, 69(10), 3094-3102.
- 14) Yue Zhou, Shuai He, Huanhuan Li, Yongmin Zhang*. CO2 and temperature control over nano-aggregate in surfactant-free microemulsion. *Langmuir*, 2021, 37(5), 1983-1990.
- 15) Yongmin Zhang, Yujun Feng*. Stimuli-responsive microemulsions: State-of-the-art and future prospects. *Curr. Opin. Colloid Interface Sci.*, 2020, 49, 27-41.
- 16) Ye Fan, Shuang Cai, Dekun Xu, Qin Sun, Xuefeng Liu*, Yongmin Zhang, Yunjun Fang. Reversible-tuning Krafft temperature of Selenium-containing ionic surfactants by redox chemistry. *Langmuir*, 2020, 36(13): 3514-3521
- 17) Yanjie Xu, Yuandi Zhang, Xuefeng Liu*, Hui Chen, Yun Fang. Retrieving oil and recycling surfactant in surfactant-enhanced soil washing. *ACS Sustainable Chem. Eng.*, 2018, 6, 4981-4986
- 18) Yongmin Zhang, Fei Qin, Xuefeng Liu*, Yun Fang. Switching worm-based viscoelastic fluid by pH and redox. *J. Colloid Interface Sci.*, 2018, 514, 554-564
- 19) Ye Fan, Jie Ma, Yun Fang*, Tingting Liu, Xueyi Hu, Yongmei Xia. Neutral and acid-adapted fatty acid vesicles of conjugated linoleic acid. *Colloids Surfaces B: Biointerfaces*, 2018, 167: 385-391
- 20) Yongmin Zhang, Yuandi Zhang, Cheng Wang, Xuefeng Liu*, Yun Fang, Yujun Feng. CO2-responsive microemulsion: reversible switching from an apparent single phase to near-complete phase separation. *Green Chem.*, 2016, 18, 392-396
- 21) Yongmin Zhang, Chengcheng Yang, Shuang Guo, Hui Chen, Xuefeng Liu*. Tandem triggering of wormlike micelles using CO2 and redox. *Chem. Commun.*, 2016, 52, 12717-12720
- 22) Yongmin Zhang, Yujun Feng*. CO2-induced smart viscoelastic fluids based on the mixture of sodium erucate and triethylamine. *J. Colloid Interface Sci.*, 2015, 447, 173-181.
- 23) Ye Fan, Yun Fang*, Lin Ma. The self-crosslinked usosome of conjugated linoleic acid: investigation of morphology, bilayer membrane and stability. *Colloids Surfaces B: Biointerfaces*, 2014, 123: 8-14
- 24) Ye Fan, Yuesheng Ren, Mengjie Wu, Yun Fang*. Self-seeding synthesis of silver nanosheets with binary reduction in poly(vinylpyrrolidone) - sodium dodecyl sulfate aggregation microreactor. *Micro & Nano Letters*, 2014, 9(10): 726-730

3. 专利

- 1) 一种油基钻屑清洗和基础油回收方法 ZL201410705872. 8
- 2) 一种含磺表面活性剂及其制备方法和应用 ZL201510915772. 2
- 3) 一种无泡型硅化脂肪酸离子液体表面活性剂及其制备方法. ZL202111372220. 3.
- 4) 一种活性氧响应型囊泡及其制备方法. ZL2020103634748.
- 5) 一种包含5-氟尿嘧啶的层层自组装纳米载体及制备方法. ZL 2018115679564
- 6) 一种脂肪酸基VC脂质的制备方法. ZL 2020104971715
- 7) 一种N,N-二烷基-N-脂肪醇聚氧乙烯醚基叔胺的制备方法 ZL 201010574368. 0
- 8) 一种自增强表面活性剂及其制备方法. ZL202010465452. 2.
- 9) 一种二茂铁杂化的壳聚糖基气凝胶的制备方法和产品及其应用. ZL2022102033324
- 10) 一种铜网基叶片状SERS活性基底的制备方法 ZL201310681981. 6