



Department: School of Materials Science and Engineering

Professional field: Polymer synthesis, Peptide mimicking,

Antimicrobial, Anti-tumor, Immune regulation

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Profile

Professor Runhui Liu obtained his Ph.D. in 2009 at Purdue University. Afterward, he took postdoctoral trainings at California Institute of Technology and University of Wisconsin-Madison during 2010 to 2014. At the end of 2014, he started his independent research in the School of Materials Science and Engineering at East China University of Science and Technology (ECUST). His current research focuses on peptide polymer-based biomaterials for antimicrobial and tissue engineering applications.

Research Field

1. Synthesis of functional polymers and monomers; research on preparation of multifunctional polymer materials and synthetic methods of polymers
2. Research and development of biocompatible and biodegradable polymer materials
3. Development of anti-bacterial and anti-fungal biological materials and mechanism study
4. Research on biomaterials with cell adhesion functions and their applications in tissue repair
5. Anti-fouling materials against non-specific protein adsorption and microbial biofilm formation and their applications in the field of biomedical engineering
6. Study on the in vivo delivery and controlled release of protein and small molecule drugs
7. Research on the anti-cancer peptide polymers

Research results and selected published papers

1. Zhang, D.#; Liu, J.#; Chen, Q.; Jiang, W.; Wang, Y.; Xie, J.; Ma, K.; Shi, C.; Zhang, H.; Chen, M.; Wan, J.; Ma, P.; Zou, J.; Zhang, W.; Zhou, F.; Liu, R.* A Sandcastle Worm-Inspired Strategy to Functionalize Wet Hydrogels. Nat. Commun. 2021, 12, 6331.
2. Wu, Y.; Chen, K.; Wu, X.; Liu, L.; Zhang, W.; Ding, Y.; Liu, S.; Zhou, M.; Shao, N.; Ji, Z.; Chen, J.; Zhu, M.; Liu, R.* Superfast and Water-Insensitive Polymerization on α -Amino Acid N-Carboxyanhydrides to Prepare Polypeptides using Tetraalkylammonium carboxylates as the Initiator. Angew. Chem. Int. Ed. 2021. DOI: 10.1002/anie.202103540.
3. Xie, J.#; Zhou, M.#; Qian, Y.; Cong, Z.; Chen, S.; Zhang, W.; Jiang, W.; Dai, C.; Shao, N.; Ji, Z.; Zou, J.; Xiao, X.; Liu, L.; Chen, M.; Li, J.; Liu, R.* Addressing MRSA Infection and Antibacterial Resistance with Peptoid Polymers. Nat. Commun. 2021, DOI: 10.1038/s41467-021-26221-y.
4. Zhang, D.; Chen, Q.; Bi, Y.; Zhang, H.; Chen, M.; Wan, J.; Shi, C.; Zhang, W.; Zhang, J.; Qiao, Z.; Li, J.; Liu, Y.; Chen, S.; Liu, R.* Bio-Inspired Hydrogels Resist the Foreign-Body Response. Nat. Commun. 2021, 12, 5327.
5. Zhou, M.; Zou, J.; Liu, L.; Xiao, X.; Deng, S.; Wu, Y.; Xie, J.; Cong, Z.; Ji, Z.; Liu, R.* Synthesis of Poly- α / β -peptides with Tunable Sequence Via the Copolymerization on N-carboxyanhydride and N-thiocarboxyanhydride. iScience, 2021 DOI: 10.1016/j.isci.2021.103124.
6. Chen, Q.; Zhang D.; Zhang W.; Zhang H.; Zou J.; Chen M.; Li J.; Yuan Y.; Liu, R.* Dual mechanism β -amino acid polymers promoting cell adhesion. Nature Communications 2021, 12, 562
7. Zhang, D.; Chen, Q.; Shi, C.; Chen, M.; Ma, K.; Wan, J.; Liu, R.* Dealing with the Foreign-Body Response to Implanted Biomaterials: Strategies and Applications of New Materials. Adv. Funct. Mater. DOI: 10.1002/adfm.202007226.
8. Etayash, H.; Qian, Y.; Pletzer, D.; Zhang, Q.; Xie, J.; Cui, R.; Dai, C.; Ma, P.; Qi, F.; Liu, R.* Hancock, R. E. W.* Host Defense Peptide-Mimicking Amphiphilic β -Peptide Polymer (Bu:DM) Exhibiting Anti-Biofilm, Immunomodulatory, and in Vivo Anti-Infective Activity. J. Med. Chem. 2020, 63, 12921-12928.
9. Zhang, D.; Chen, Q.; Zhang, W.; Liu, H.; Wan, J.; Qian, Y.; Li, B.; Tang, S.; Liu, Y.; Chen, S.; Liu, R.* Silk - inspired β - peptide Materials Resist Fouling and the Foreign - body Response. Angew. Chem. Int. Ed. 2020, 59, 9586–9593. **(Hot Paper)**
10. Zhou, M.; Xiao, X.; Cong, Z.; Wu, Y.; Zhang, W.; Ma, P.; Chen, S.; Zhang, H.; Zhang, D.; Zhang, D.; Luan, X.; Mai, Y.; Liu, R.* Water Insensitive Synthesis of Poly- β -Peptides with Defined Architecture. Angew. Chem. Int. Ed. 2020, 59, 7240-7244.
11. Zhou, M.; Qian, Y.; Xie, J.; Zhang, W.; Jiang, W.; Xiao, X.; Chen, S.; Dai, C.; Cong, Z.; Ji, Z.; Shao, N.; Liu, L.; Wu, Y.; Liu, R.* Poly(2 - Oxazoline) Based Functional Mimics of Peptides to Eradicate MRSA Infections and Persisters While Alleviating Antimicrobial Resistance. Angew. Chem. Int. Ed. 2020, 59, 6412-6419. **(VIP paper, Inside Cover, Highly Cited Paper)**
12. Chen, Q.; Yu, S.; Zhang, D.; Zhang, W.; Zhang, H.; Zou, J.; Mao, Z.; Yuan, Y.; Gao C.; Liu, R.* Impact of Antifouling PEG Layer on the Performance of Functional Peptides in Regulating Cell Behaviors. J. Am. Chem. Soc. 2019, 141, 16772
13. Wu, Y.; Zhang, D.; Ma, P.; Zhou, R.; Hua, L.; Liu, R.* Lithium hexamethyldisilazide initiated superfast ring opening polymerization of α -amino acid N-carboxyanhydrides. Nat. Commun. 2018, 9 (1), 5297.
14. Ding, X.; Duan, S.; Ding, X.; Liu, R.*; Xu, F.* Versatile Antibacterial Materials: An Emerging Arsenal for Combatting Bacterial Pathogens. Adv. Funct. Mater. 2018, 28 (40), 19. **(Highly Cited Paper)**