Tong Li

Phone： +86 18791040420

Email： tongli523@163.com Montreal Canada

EDUCATION

National Institute of Scientific Research (INRS), Montreal, Canada *01/2024-Now*

Doctor of Engineering

Shanghai University of Electric Power, Shanghai, China *09/2020-06/2023*

Master of Engineering

Core courses: Advanced Heat Transfer, Advanced Engineering Thermodynamics, Advanced Combustion Science, Calculation Method, Smart Energy

Jilin University, Jilin, China *09/2016-06/2020*

Bachelor of Engineering

Core courses: Higher Mathematics, Heat Transfer, Engineering Thermodynamics, Theoretical Mechanics, Mechanics of Materials, Mechanical design, Fluid Mechanics

RESEARCHES & RELEVANT EXPERIENCES

The main research directions are electrolytic water splitting into weak alkaline media, metal-air batteries and synergistic applications of photo and electrocatalysis. Combining theoretical simulation and experimental validation, we provide effective guidance for material design and experimental optimization by constructing molecular models of new non-precious metal-based electrode materials and calculating transition state-free energies such as OH^*, O^* and OOH^* during water decomposition using theories such as first principles and Gibbs function. The main results are as follows:

1. Discovered the phenomenon of large catalytic potential in microscopic materials with different scales of coexistence of similar structures, and proposed the "star effect" with "construction of local fields, accelerated electron transport, and scale effect" as the core, expanding part of the theory of nanomaterials.
2. Proposed early-later double transition metal tellurides as advanced catalysts for overall electrolytic water, discovered reliable synergistic effects of early-later double transition metal sulfur compounds and broadened the research direction of transition metals in the field of overall electrolytic water splitting.
3. New green and sustainable non-precious metal-based heterostructured electrocatalysts were constructed and transition metal-based oxygen precipitation reaction electrocatalyst applications were developed.
4. Using carbon nanoboxes loaded with cobalt atoms as a reliable catalyst for the preparation of green and sustainable energy, introducing non-metallic elements to improve the bonding environment of the central catalytic atoms and optimize the electronic environment of the reaction centre, and proposing the concept of "reaction sub-centre", which provides a new idea for the design of monometallic catalysts.

Related Research Papers

- **First Author Papers：**

1. **Tong Li**, Siyuan Ren, Cheng Zhang, LingXia Qiao, Jiang Wu*, Ping He, Jia Lin, Yongsheng Liu*, Zaiguo Fu, Qunzhi Zhu, Weiguo Pan, Baofeng Wang, Zhongwei Chen*. Cobalt single atom anchored on N-doped carbon nanoboxes as typical single-atom catalysts (SACs) for boosting the overall water splitting. ***Chemical Engineering Journal*** 458 (2023) 141435. (IF=15.1) (Highly cited paper)
2. **Tong Li**, Jiang Wu*, Lingxia Qiao, Qunzhi Zhu, Zaiguo Fu, Jia Lin, Jing Chen, Lin Peng, Baofeng Wang, Zhongwei Chen*, Bimetallic Ni-Hf Tellurides as an Advanced Electrocatalyst for Overall Water Splitting with Layered g-C_3N_4 Modification. ***Materials Today Energy*** 26 (2022) 101002. (IF=9.3)
3. **Tong Li**, Xinxia Ma, Daolei Wang*, Jiang Wu*, Fasong Zheng, Jiawen Jin, Qikun Wang, Liangsheng Hao, Zhaojie Li, Sijia Huang. 3D Nanostructured Nickel Hydroxide as An Efficient Electrocatalyst for Oxygen Evolution Reaction. ***Electrocatalysis*** 6 (2022) 873-886. (IF=3.1) (Cover paper)
4. **Tong Li**, Xinxia Ma, Jiang Wu*, Fenghong Chu, Lingxia Qiao, Yubao Song, Maoliang Wu, Jia Lin, Lin Peng, Zhongwei

Chen*, $Ni(OH)_2$ microspheres in situ self-grown on ultra-thin layered g-C_3N_4 as a heterojunction electrocatalyst for oxygen evolution reaction. ***Electrochimica Acta*** 400 (2021) 139473. (IF=6.6)

5. **Tong Li**, Siyuan Ren, Jiang Wu*, Min Zhou, Cheng Peng, Hai Zhang, Ping He, Xuemei Qi, Mao Song, Yuzhuo Zhou, Shuo Chen, Constructing Bi_2O_3/$BiOIO_3$ triple heterojunction doped with Yb^{3+} ions as accelerating charge carriers transfer channel to enhance photocatalytic activity. ***Solid State Sciences*** 139 (2023) 107151. (IF=3.5)

- **Selected Collaborative Papers：**

6. Jiachen Li, **Tong Li**, Fengting Li, Tao Jia, Jiang Wu*, Sikai Wu, Yang Ling, Ping He, Xu Mao, Jie Dong, Insights into the mechanism of elemental mercury removal via ferric chloride modified carbon Aerogel: An experimental and theoretical research. ***Chemical Engineering Journal*** 453 (2023) 139976. (IF=15.1)
7. Liangsheng Hao, **Tong Li**, Xinxia Ma, Jiang Wu*, Lingxia Qiao, Xuefei Wu, Guoyu Hou, Haonan Pei, Xingbo Wang, Xiaoyu Zhan, A tin-based perovskite solar cell with an inverted hole-free transport layer to achieve high energy conversion efficiency by SCAPS device simulation. ***Optical and Quantum Electronics*** 53 (2021) 524. (IF=3)
8. Lingxia Qiao, **Tong Li**, Zhihai Cheng, Kaiyuan Liu, Zihao Chen, Jiang Wu*, Jia Lin, Jing Chen, Runhao Zhu, Haoyan Yang, Nanoflower-like cobalt-based sulfides catalyst with high electrocatalytic activity for oxygen evolution reaction. ***Journal of Electroanalytical Chemistry*** 918 (2022) 116454. (IF=4.5)
9. Xin Zhang, **Tong Li**, Quanzhong Wei, Chen Peng, Wenjie Li, Xinxia Ma, Zhihai Cheng, Jiang Wu*, Jiaxin Su, Wenhao Li, Germanium-lead double absorber layer perovskite solar cells: Further performance enhancement from the perspective of device simulation. ***Optics Communications*** 530 (2023) 129188. (IF=2.4)
10. Guoyu Hou, Jiang Wu*, **Tong Li**, Jia Lin, Baofeng Wang, Lin Peng, Ting Yan, Liangsheng Hao, Lingxia Qia, Xuefei Wu. Nitrogen-rich biomass derived three-dimensional porous structure captures Fe Ni metal nanospheres: An effective electrocatalyst for oxygen evolution reaction. ***International Journal of Hydrogen Energy*** 47 (2022) 12487. (IF=7.2)
11. Yixuan Xiao, Jiang Wu*, Tao Jia, **Tong Li**, Ziqian Wang, Yongfeng Qi, Qizhen Liu*, Xuemei Qi, Ping He, Fabrication of BiOI nanosheets with exposed (001) and (110) facets with different methods for photocatalytic oxidation elemental mercury. ***Colloid and Interface Science Communications*** 40 (2021) 100357. (IF=4.5)
12. Liangsheng Hao, Min Zhou, Yubao Song, Xinxia Ma, Jiang Wu*, Qunzhi Zhu, Zaiguo Fu, Yihao Liu, Guoyu Hou, **Tong Li**, Tin-based perovskite solar cells: Further improve the performance of the electron transport layer-free structure by device simulation. ***Solar Energy*** 230 (2021) 345. (IF=6.7)

Patents

- **Utility Model：**

1. Bin Duan; **Tong Li**; Xinsheng Li; Zitong Wang; Yuan Gao. An intelligent garbage transport dumping vehicle: China, ZL 2019 2 0525882.1 [P].
2. Jiang Wu; **Tong Li**; Xu Mao; Xinxia Ma; Lingxia Qiao; Xuefei Wu; Hao Shen; Cheng Zhang; Haochen Wang; Fenglin Zhu. An adaptive rotating electrode holder: China, ZL 2021 2 0437971.8 [P].

- **Invention：**

1. Jiang Wu; **Tong Li**; Yu Wu; Xinxia Ma; Qizhen Liu; Xingbo Wang; Cheng Zhang; Lingxia Qiao; Xuefei Wu; Fenglin Zhu. A three-dimensional structured nickel hydroxide OER electrocatalyst preparation method. Application Number：202210453719.5
2. Jiang Wu; **Tong Li**; Maoliang Wu; Cheng Peng; Lingxia Qiao; Xu Mao; Yunfei Wang; Xinxia Ma; Xuefei Wu; Chenxu Jin. Preparatin of $Ni(OH)_2$-g-C_3N_4 heterostructure for efficient OER electrocatalyst. Application Number：202210429065.2
3. Jiang Wu; **Tong Li**; Lingxia Qiao; Yu Wu; Kaiyuan Liu; Zaiguo Fu; Cheng Zhang; Hao Shen; Xinxia Ma; Meilin Zhang. A method of preparing all-electrolytic water electrocatalyst and electrocatalyst and application: China, ZL 2022 1 0210455.0 [P].
4. Jiang Wu; **Tong Li**; Cheng Zhang; Lingxia Qiao; Kaiyuan Liu; Zaiguo Fu; Xuefei Wu; Hao Shen; Xinxia Ma; Meilin Zhang. A method for the preparation of an efficient all-electrolytic water catalyst with cobalt single-atom loading on nitrogen-rich carbon nanoboxes: China, ZL 2022 1 0453978.8 [P].

Scientific Research Projects

- **Jilin University Student Innovation and Entrepreneurship Training Program (National)** *05/2018-05/2019*

Research on artificial intelligence-based waste transport dumping vehicle, In Charge

- **National Key R&D Program (2018YFB0605103-4)** *05/2018-05/2021*

WESP Heavy Metal Removal Technology Development, Participate in heavy metal removal catalyst development

- **Shanghai Natural Science Foundation (18ZR1416200)** *06/2018-05/2021*

Preparation of graphene-loaded sulfur-doped bismuth-based photocatalyst and its mechanism of mercury removal, Participate in graphene process development and pre-processing

- **National Natural Science Foundation of China (52076126)** *01/2021-12/2024*

Mechanistic study of photocatalytic-adsorption of g-C_3N_4-loaded sulfur-doped bismuth-based complexes for the control of mercury and arsenic in flue gas, Participation in the design and preparation of layered g-C_3N_4

- **Shanghai Photovoltaic Transformation and Application Innovation Team** *10/2021-09/2025*

"Photocatalysis and Energy Storage Technology" sub-team, Participation in energy storage technology development

- **Shanghai High-Level Local University Platform** *01/2022-12/2022*

High-efficiency energy storage materials preparation and comprehensive test platform, Participate in the development of new non-precious metal-based energy storage materials

International Academic Conferences

- 2020 Annual Meeting of the Chinese Society of Engineering Thermophysics in Combustion Science, Xiamen China, *11/2020*
- 2020 Annual Meeting of the Special Committee on Environmental Protection Technology and Equipment of the Chinese Society of Power Engineering, Shanghai China, *01/2021*
- The 6th International Conference on Advances in Energy and Environmental Research, Shanghai China, *09/2021*
- 2021 Annual Meeting of the Chinese Society of Engineering Thermophysics in Combustion Science, Dalian China, *01/2022*
- The 7th International Conference on Advances in Energy and Environmental Research, Shanghai China, *09/2022*
- 2022 Annual Meeting of Shanghai Engineering Thermophysics Society, Shanghai China, *03/2023*

Awards and Honors

1. Shanghai Outstanding Graduate Student, *03/2023*
2. Outstanding Graduate Students at University Level, *03/2023*
3. Outstanding Students at School Level, *12/2022*
4. National Scholarship, *09/2022*
5. National Student Energy Conservation and Emission Reduction Competition (2nd Prize), *08/2022*
6. Advanced Individuals of School Level Student Social Practice, *12/2021*
7. Academic Scholarships at School Level, *10/2021*
8. Jilin University Student Innovation and Entrepreneurship Training Program (National), *05/2019*
9. "2018 Safe Driving Innovation Competition" of Beijing Green Creative Charity Foundation (Excellence Award), *10/2018*
10. The 4th Jilin University Student Environmental Innovation and Technology Competition (3rd prize), *07/2018*
11. The 4th Jilin University "Internet+" Student Innovation and Entrepreneurship Competition (3rd prize), *05/2018*
12. School Level Scholarship, *07/2017*

TECHNICAL PROFICIENCIES

Computer Skills: Material Studio (MS), Vienna Ab-initio Simulation Package (VASP), Origin, XPS peak, Jade

Language: Mandarin (Native), English (Good)