

Qizhang Li

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Pritzker School of Molecular Engineering, The University of Chicago, USA

EDUCATION

09/2016 to 07/2022 **Ph.D. in Power Engineering and Engineering Thermophysics**

Department of Engineering Mechanics, Tsinghua University, Beijing, China

Supervisor: Prof. Qun Chen

09/2012 to 07/2016 **B.S. in New Energy Science and Engineering**

Zhejiang University, Hangzhou, Zhejiang, China

Cumulative GPA: 3.93/4.0 (Rank: 1/33)

RESEARCH EXPERIENCE

1. Rational design of near-field radiative thermal diode

- Established a LDOS-based approach for the rational design of near-field radiative thermal diode with ultrahigh rectification performance.
- Theoretically demonstrated some record-high rectification ratios (R) successively.
 - 1) Thin films of metal-to-insulator transition materials: $R > 140$.
 - 2) Hyperbolic metamaterials: $R > 320$.
 - 3) Thin films of intrinsic semiconductors: $R \sim 10^5$.

2. Exploration of fundamental limit to near-field radiative thermal rectification

- Identified $\epsilon_H''/\epsilon_L''$ as an upper bound on the thermal rectification via an intrinsic semiconductor film, where ϵ_H'' and ϵ_L'' are respectively the imaginary parts of permittivity at high and low temperatures.
- Revealed that an intrinsic silicon film could potentially enable rectifications of $>10^9$.

PUBLICATIONS

[1] **Qizhang Li**[†], Haiyu He[†], Qun Chen^{*}, Bai Song^{*}, Thin-film radiative thermal diode with large rectification, **Physical Review Applied**, 014069, 2021.

[2] **Qizhang Li**[†], Haiyu He[†], Qun Chen, Bai Song^{*}, Radiative thermal diode via hyperbolic metamaterials, **Physical Review Applied**, 064022, 2021.

[3] **Qizhang Li**, Qun Chen, Bai Song^{*}, Giant radiative thermal rectification using an intrinsic semiconductor film, **Materials Today Physics**, 100632, 2022.

[4] **Qizhang Li**, Qun Chen^{*}, Bai Song^{*}, Fundamental limit to the rectification of near-field heat flow: The potential of intrinsic semiconductor films, **Phys. Rev. B**, 075408, 2022.

PATENTS

- [1] Qun Chen, **Qizhang Li**, Bai Song, Haiyu He. Radiative thermal control device and its applications: China, 202111052867.8[P], 2022-10-18.
- [2] Bai Song, Qun Chen, **Qizhang Li**, Haiyu He. A radiative thermal control device: China, 202110247073.0, 2021-03-05 (Under review).
- [3] Bai Song, Qun Chen, **Qizhang Li**. A radiative thermal control device based on semiconductors: China, 202111160015.0, 2021-09-30 (Under review).
- [4] Qun Chen, **Qizhang Li**, Bai Song. A radiative thermal control device based on semiconductor nanoarrays: China, 202210565678.9, 2022-05-23 (Under review).

HONORS AND AWARDS

- 2017 1st Place of the 12th National Environmental-friendly Science & Technology Competition
- 2016 Gold Medal & Special Prize of the 44th International Exhibition of Inventions of Geneva
- 2015 1st Place of the Student Day Competition of the 2nd Global Grand Challenges Summit
- 2015 Meritorious Winner in Interdisciplinary Contest in Modelling (MCM/ICM)

ACTIVITIES

- 2022 International Conference on Thermodynamics and Thermal Metamaterials, online.
- 2022 Photonics and Electromagnetics Research Symposium (PIERS), online.
- 2019 The 13th International Nanoscience Student Conference (INASCON), Beijing, China.
- 2015 Summer Research Program in North Carolina State University, North Carolina State, USA.

REFERENCES

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Prof. Zitao Yu

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