**Pin thể rắn: Cách mạng trong công nghệ pin**

Pin thể rắn là loại pin có 2 thành phần “điện cực” và “chất điện phân” đều ở trạng thái rắn. Chúng có tác dụng thay cho chất lỏng hoặc Polyme để dẫn ion thường thấy ở pin Li-ion hoặc pin Li-ion polyme.

Pin thể rắn là công nghệ hoàn toàn mới, có xu hướng phát triển nhanh chóng trong tương lai. Pin trạng thái rắn có thể ứng dụng trong nhiều lĩnh vực khác như ô tô, xe máy, máy bay, tàu thuyền,... và cả các phương tiện thuộc lĩnh vực quân sự. Nhiều chuyên gia dự đoán rằng trong tương lai loại pin này có thể sẽ thay thế pin Lithium-ion.

Để hiểu rõ hơn Cục Thông tin KH&CN quốc gia xin giới thiệu một số bài nghiên cứu đã được xuất bản chính thức và các bài viết được chấp nhận đăng trên những cơ sở dữ liệu học thuật chính thống.

**1. Springer**

1. Room temperature manufacture of dense NaSICON solid electrolyte films for all-solid-state-sodium batteries
Mutlucan Sozak, Tobias Nazarenus, Jörg Exner, Jaroslaw Kita… in Journal of Materials Science (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs10853-023-08642-w.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s10853-023-08642-w.pdf?pdf=core)

2. Ultrathin thiol-ene crosslinked polymeric electrolyte for solid-state and high-performance lithium metal batteries
Zhifeng Li 李志峰, Tianyi Wang 王天羿, Lei Zhong 钟雷, Min Xiao 肖敏… in Science China Materials (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs40843-022-2259-3.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s40843-022-2259-3.pdf?pdf=core)

3. Recent Progress in and Perspectives on Emerging Halide Superionic Conductors for All-Solid-State Batteries
Kaiyong Tuo, Chunwen Sun, Shuqin Liu in Electrochemical Energy Reviews (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs41918-023-00179-5.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s41918-023-00179-5.pdf?pdf=core)

4. Review on interfacial compatibility of solid-state lithium batteries
Yichi Zhang, Guoxu Zheng, Zhuo Yuan, Xinzhe Huang, Feiyan Long, Yinan Li in Ionics (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs11581-023-04952-w.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s11581-023-04952-w.pdf?pdf=core)

5. Room temperature manufacture of dense NaSICON solid electrolyte films for all-solid-state-sodium batteries
Mutlucan Sozak, Tobias Nazarenus, Jörg Exner, Jaroslaw Kita… in Journal of Materials Science (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs10853-023-08642-w.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s10853-023-08642-w.pdf?pdf=core)

6. Cellulose acetate-promoted polymer-in-salt electrolytes for solid-state lithium batteries
Qingyang Ma, Dian Liu, Bo Wang, Wenyi Liu… in Journal of Solid State Electrochemistry (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs10008-023-05414-z.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s10008-023-05414-z.pdf?pdf=core)

7. All-Solid-State Thin-Film Lithium-Sulfur Batteries
Renming Deng, Bingyuan Ke, Yonghui Xie, Shoulin Cheng, Congcong Zhang… in Nano-Micro Letters (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs40820-023-01064-y.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s40820-023-01064-y.pdf?pdf=core)

8. Bulk and interface-strengthened Li7P2.9Sb0.1S10.65O0.15I0.2 electrolyte via dual-source doping for all-solid-state lithium-sulfur batteries
Bo-Sheng Zhao 赵博生, Peng Chen 陈鹏, Xue-Ping Gao 高学平 in Science China Materials (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs40843-022-2182-0.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s40843-022-2182-0.pdf?pdf=core)

9. Recycling of garnet solid electrolytes with lithium-dendrite penetration by thermal healing
Shaojie Chen 陈邵杰, Xiangchen Hu 胡祥辰, Lu Nie 聂璐, Yi Yu 于奕… in Science China Materials (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs40843-022-2371-9.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s40843-022-2371-9.pdf?pdf=core)

10. Tailoring Practically Accessible Polymer/Inorganic Composite Electrolytes for All-Solid-State Lithium Metal Batteries: A Review
Hongmei Liang, Li Wang, Aiping Wang, Youzhi Song, Yanzhou Wu… in Nano-Micro Letters (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs40820-022-00996-1.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s40820-022-00996-1.pdf?pdf=core)

11. Improved Ga-doped Li7La3Zr2O12 garnet-type solid electrolytes for solid-state Li-ion batteries
Omid Sharifi, Mohammad Golmohammad… in Journal of Solid State Electrochemistry (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs10008-023-05522-w.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s10008-023-05522-w.pdf?pdf=core)

12. Effects of pressure, temperature, and plasticity on lithium dendrite growth in solid-state electrolytes
Haodong Yang, Zhanjiang Wang in Journal of Solid State Electrochemistry (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs10008-023-05560-4.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s10008-023-05560-4.pdf?pdf=core)

13. Fabrication of composite solid electrolyte based on MOF with functional ionic liquid for integrated lithium–air batteries
Ping Lou, Long Li, Yiyun Wu, Lingping Yue, Yao Wang, Shun Tang, Weixin Zhang… in Ionics (2023)
[https://link.springer.com/content/pdf/10.1007%2Fs11581-023-04938-8.pdf?pdf=core](https://link.springer.com/content/pdf/10.1007/s11581-023-04938-8.pdf?pdf=core)

**2. Sciencedirect**

1. Material, configuration, and fabrication designs for lean-electrolyte lithium–sulfur cell with a high-loading sulfur cathode
Journal of Power Sources 11 March 2023 Volume 566 (Cover date: 15 May 2023) 232944
Cheng-Che Wu, Sheng-Heng Chung
[https://www.sciencedirect.com/science/article/pii/S0378775323003191/pdfft?md5=2245c50de72859ae2cbae4c781104252&pid=1-s2.0-S0378775323003191-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S0378775323003191/pdfft?md5=2245c50de72859ae2cbae4c781104252&pid=1-s2.0-S0378775323003191-main.pdf)

2. Flexible solvent-free polymer electrolytes for solid-state Na batteries
Journal of Power Sources 9 January 2023 Volume 559 (Cover date: 1 March 2023) 232644
Cynthia S Martinez-Cisneros, Bidhan Pandit, Jean-Yves Sanchez
[https://www.sciencedirect.com/science/article/pii/S0378775323000198/pdfft?md5=bc4d5ac42376ca5eac59878ae5d8f13a&pid=1-s2.0-S0378775323000198-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S0378775323000198/pdfft?md5=bc4d5ac42376ca5eac59878ae5d8f13a&pid=1-s2.0-S0378775323000198-main.pdf)

3. In situ induced crosslinking highly conductive solid polymer electrolyte with intimated electrodes interfacial compatibility for safe Li-ion batteries
Journal of Power Sources 27 December 2022 Volume 557 (Cover date: 15 February 2023) 232568
Wei Zhang, Lei Jin, Hohyoun Jang
[https://www.sciencedirect.com/science/article/pii/S0378775322015452/pdfft?md5=51e93a170c2c65b4f711317f1ef6d53d&pid=1-s2.0-S0378775322015452-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S0378775322015452/pdfft?md5=51e93a170c2c65b4f711317f1ef6d53d&pid=1-s2.0-S0378775322015452-main.pdf)

4. Constructing a BiF3/Bi7F11O5 multiple-phase composite as advanced cathode for room-temperature all-solid-state fluoride-ion batteries
Journal of Electroanalytical Chemistry 12 December 2022 Volume 928 (Cover date: 1 January 2023) 117073
Jiali Liu, Zihao Zang, Xianyou Wang
[https://www.sciencedirect.com/science/article/pii/S1572665722010670/pdfft?md5=8d567cf4d119df664bef32903571f7ce&pid=1-s2.0-S1572665722010670-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S1572665722010670/pdfft?md5=8d567cf4d119df664bef32903571f7ce&pid=1-s2.0-S1572665722010670-main.pdf)

5. In situ induced growth strategy of Co2P nanocrystals encapsulated into stable 3D carbon network as a bifunctional electrocatalyst for Zn-air battery
International Journal of Hydrogen Energy 9 January 2023 Volume 48, Issue 36 (Cover date: 29 April 2023) Pages 13404-13414
Qi Shao, Jiaqi Liu, Yan Li
[https://www.sciencedirect.com/science/article/pii/S0360319922061353/pdfft?md5=91a737f701bd7a08d63f73c581d3facb&pid=1-s2.0-S0360319922061353-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S0360319922061353/pdfft?md5=91a737f701bd7a08d63f73c581d3facb&pid=1-s2.0-S0360319922061353-main.pdf)

6. Latest progresses and the application of various electrolytes in high-performance solid-state lithium-sulfur batteries
Journal of Energy Chemistry 14 April 2023 Volume 82 (Cover date: July 2023) Pages 170-197
Yanan Li, Nanping Deng, Bowen Cheng
[https://www.sciencedirect.com/science/article/pii/S2095495623002061/pdfft?md5=ed17dc12cd8f8a557b60993b940872ae&pid=1-s2.0-S2095495623002061-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S2095495623002061/pdfft?md5=ed17dc12cd8f8a557b60993b940872ae&pid=1-s2.0-S2095495623002061-main.pdf)

7. Ultrastable and ultrafast 3D charge–discharge network of robust chemically coupled 1 T-MoS2/Ti3C2 MXene heterostructure for aqueous Zn-ion batteries
Chemical Engineering Journal 23 November 2022 Volume 455 (Cover date: 1 January 2023) 140539
Fei Long, Qixiang Zhang, Yihua Gao
[https://www.sciencedirect.com/science/article/pii/S1385894722060193/pdfft?md5=e1688fa6ecd690548784bfc582cde884&pid=1-s2.0-S1385894722060193-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S1385894722060193/pdfft?md5=e1688fa6ecd690548784bfc582cde884&pid=1-s2.0-S1385894722060193-main.pdf)

8. An aqueous magnesium-ion battery working at −50 °C enabled by modulating electrolyte structure
Chemical Engineering Journal 5 December 2022 Volume 455 (Cover date: 1 January 2023) 140806
Guoshen Yang, Xianqi Xu, Hang Zhou
[https://www.sciencedirect.com/science/article/pii/S1385894722062866/pdfft?md5=0cdd599a188385b8d4e06485de892074&pid=1-s2.0-S1385894722062866-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S1385894722062866/pdfft?md5=0cdd599a188385b8d4e06485de892074&pid=1-s2.0-S1385894722062866-main.pdf)

9. Synthesis of single-crystal LiNi0.8Co0.1Mn0.1O2 materials for Li-ion batteries by microfluidic technology
Chemical Engineering Journal 27 March 2023 Volume 464 (Cover date: 15 May 2023) 142656
Wenbiao Liang, Feng Jin, Shuai Yuan
[https://www.sciencedirect.com/science/article/pii/S1385894723013876/pdfft?md5=4dd34bcd123d7b053576c8291e7336a9&pid=1-s2.0-S1385894723013876-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S1385894723013876/pdfft?md5=4dd34bcd123d7b053576c8291e7336a9&pid=1-s2.0-S1385894723013876-main.pdf)

10. Perovskite rare earth porous hollow microspheres of SmFeO3/MWCNT battery type asymmetric hybrid supercapacitors
Electrochimica Acta 14 May 2023 Volume 461 (Cover date: 1 September 2023) 142519
M. Isacfranklin, R. Yuvakkumar, Dhayalan Velauthapillai
[https://www.sciencedirect.com/science/article/pii/S0013468623006977/pdfft?md5=7311f95da4398667b1cc51046554d0d3&pid=1-s2.0-S0013468623006977-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S0013468623006977/pdfft?md5=7311f95da4398667b1cc51046554d0d3&pid=1-s2.0-S0013468623006977-main.pdf)

11. Ordered LiFe5O8 thin films prepared by pulsed laser deposition as an anode material for all-solid thin film batteries
Electrochimica Acta 29 March 2023 Volume 454 (Cover date: 20 June 2023) 142318
Sruthy Subash, S. Udhayakumar, K. Kamala Bharathi
[https://www.sciencedirect.com/science/article/pii/S0013468623004954/pdfft?md5=a4a199338d82cc3afc747b0547a9445f&pid=1-s2.0-S0013468623004954-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S0013468623004954/pdfft?md5=a4a199338d82cc3afc747b0547a9445f&pid=1-s2.0-S0013468623004954-main.pdf)

12. Ultra-long-life and ultrathin quasi-solid electrolytes fabricated by solvent-free technology for safe lithium metal batteries
Energy Storage Materials 11 March 2023 Volume 58 (Cover date: April 2023) Pages 132-141
Peng Liu, Lei Zhong, Yuezhong Meng
[https://www.sciencedirect.com/science/article/pii/S2405829723001125/pdfft?md5=00a79472ad72cb266e00c3e10a97c449&pid=1-s2.0-S2405829723001125-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S2405829723001125/pdfft?md5=00a79472ad72cb266e00c3e10a97c449&pid=1-s2.0-S2405829723001125-main.pdf)

13. Visualizing internal micro-damage distribution in solid oxide fuel cells
Journal of Power Sources 12 April 2023 Volume 570 (Cover date: 30 June 2023) 233059
Kazuhisa Sato, Yoshie Yabuta, Tatsuya Kawada
[https://www.sciencedirect.com/science/article/pii/S0378775323004342/pdfft?md5=58e09f4643b4b9f11dbdfd18a2f22f54&pid=1-s2.0-S0378775323004342-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S0378775323004342/pdfft?md5=58e09f4643b4b9f11dbdfd18a2f22f54&pid=1-s2.0-S0378775323004342-main.pdf)

14. Investigation of active heating systems for polymer-solid-state cells in an automotive battery module
Journal of Power Sources 17 March 2023 Volume 567 (Cover date: 30 May 2023) 232968
Anselm Mülberger, Nico Körber, Alexander Michaelis
[https://www.sciencedirect.com/science/article/pii/S0378775323003439/pdfft?md5=1da3566171efb79f5d1ac2dea0f27b90&pid=1-s2.0-S0378775323003439-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S0378775323003439/pdfft?md5=1da3566171efb79f5d1ac2dea0f27b90&pid=1-s2.0-S0378775323003439-main.pdf)

15. Y3+ doping and electrochemical properties of LiFe0.5Mn0.5PO4@C cathode material for lithium-ion batteries
Journal of Alloys and Compounds 18 May 2023 Volume 960 (Cover date: 15 October 2023) 170610
Jiawei Zheng, Jianwen Yang, Qing Zhu
[https://www.sciencedirect.com/science/article/pii/S0925838823019138/pdfft?md5=22ebe27fd6a1eb05b6f064a05a614ae5&pid=1-s2.0-S0925838823019138-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S0925838823019138/pdfft?md5=22ebe27fd6a1eb05b6f064a05a614ae5&pid=1-s2.0-S0925838823019138-main.pdf)

16. Electrical, transport, and optical properties of a novel PVB-NaNO3 complexed solid polymer electrolyte thin-films for solid-state battery
Materials Today: Proceedings Available online 4 May 2023 In press, corrected proof
Umadevi Prasanna, Vijaya Kumar Kambila, V. V. Manju
[https://www.sciencedirect.com/science/article/pii/S2214785323020825/pdfft?md5=b63d9dd492db00bee8e3da119a00474f&pid=1-s2.0-S2214785323020825-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S2214785323020825/pdfft?md5=b63d9dd492db00bee8e3da119a00474f&pid=1-s2.0-S2214785323020825-main.pdf)

17. Direct growth of hierarchically SnS2 layered nanostructure on nickel foam for high-performance solid-state supercapacitors
Materials Today: Proceedings 12 November 2022 Volume 74, Part 4 (Cover date: 2023) Pages 730-735
Prasanta Kumar Sahoo, Niraj Kumar, Abhishek Tripathi
[https://www.sciencedirect.com/science/article/pii/S2214785322068201/pdfft?md5=b8232785ddb1a3e88e49f3e61ab3b797&pid=1-s2.0-S2214785322068201-main.pdf](https://www-sciencedirect-com.dbvista.idm.oclc.org/science/pii/S2214785322068201/pdfft?md5=b8232785ddb1a3e88e49f3e61ab3b797&pid=1-s2.0-S2214785322068201-main.pdf)

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