

新世代綠能電池之關鍵技術開發：軟與硬之整合方案

Development of key technologies for the new generation of green energy batteries : Integration of soft and hard

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The team of Assistant Professor Ho-Hsiu Chou in the Department of Chemical Engineering has developed a non-toxic "semiconductor polymer nanoparticle" that can use visible light to generate clean and renewable energy hydrogen. The research results were published in the top international catalyst journal "ACS Catalysis". (SCI IF: 13.084).¹ Professor Hsing-Yu Tuan announced that the RP/C-KMnHCF full battery can output a new high specific energy density of 193 Wh kg⁻¹ among potassium ion full batteries.² (SCI IF=16.806) and was selected as a front cover story by the editor. Professor Hao-Wu Lin develops electronic equipment for human retinal nerve function. This research shows that the halide perovskite artificial human photoreceptor has a specific light response to red, green and blue. It was published in *Advanced Materials* and was selected as the cover story.³ He also developed a layer-by-layer structure of active perovskite film, which can realize the new growth of cesium-lead halide perovskite film prepared by the rapid alternate deposition of thousand layers. Under 1000 lux fluorescent lighting, the use of these devices for ambient light energy collection can provide a power conversion efficiency of 33.9%. The result was published in *Advanced Functional Materials* (SCI IF: 18.808).⁴ The collaboration between Masaki Horie and Professor Hsing-Yu Tuan uses sub-micron-sized silicon and a conjugated polymer binder to obtain high-performance lithium-ion batteries with high specific capacity and stability at high charge and discharge rates. They show a high capacity of up to 2700 mA h g⁻¹ under 1.0 C charge and discharge. Even after 1000 cycles, they can still maintain 52% of the electric capacity. This strategy will become the best in the field of lithium-ion batteries and energy storage. This work has been published in *ACS Sustainable Chem. Eng* (SCI IF:8.198).⁵

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References

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摘要所述之重點成果

1. A non-toxic "semiconductor polymer nanoparticle" that can use visible light to generate clean and renewable energy hydrogen.
2. The RP/C-KMnHCF full battery can output a new high specific energy density of 193 Wh kg^{-1} among potassium ion full batteries.
3. Hao-Wu Lin develops electronic equipment for human retinal nerve function.
4. A layer-by-layer structure of active perovskite film, which can realize the new growth of cesium-lead halide perovskite film prepared by the rapid alternate deposition of thousand layers that can provide a power conversion efficiency of 33.9%.
5. Sub-micron-sized silicon and a conjugated polymer binder to obtain high-performance lithium-ion batteries with high specific capacity and stability at high charge and discharge rates.

