

子項目一：高性能真空沉積薄膜太陽能電池結構和組件

Subtopic 1: High Performance Vacuum Deposited Thin Film PV Cells and Modules

CIGS 太陽能電池的性能優化 Device Optimization of CIGS Solar Cells

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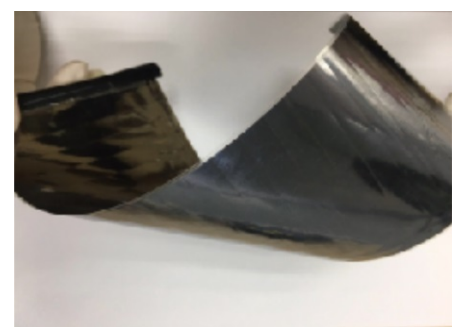
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產品：柔性 CIGS 薄膜太陽能電池

Product: Flexible CIGS Thin Film Solar Panels

傳統的矽基太陽能電池容量大，對太陽光的轉換率可以達到20%，技術成熟，但是它的最大問題，是必須加工成堅硬的板塊狀電池板，這就限制了它的許多日常用途。柔性太陽能電池重量輕，而且可以折疊、捲曲，甚至黏貼在其它物體的表面，例如汽車玻璃，衣服等。團隊採用自行研發的技術，生產了柔性 CIGS（銅銦鎵硒）薄膜太陽能電池。

The traditional silicon-based solar cells is a mature technology. It has a good capacity and solar power conversion efficiency as high as 20%. However, its shortcoming is that it has to be mounded onto thick substrate modules, significantly limited its widespread applications. By contrast, the flexible kind of solar cells is light, foldable and bendable, and even can be struck onto the surface of different objects e.g. vehicle windows or clothes. The research team invented their own technology and developed their flexible CIGS (Copper Indium Gallium Selenium) thin film solar cells.



團隊研發的柔性 CIGS 薄膜太陽能電池。
Flexible CIGS Thin Film Solar panel developed by the team.



團隊設於香港中文大學物理系實驗室內之大型實驗儀器：CIGS Evaporation Chamber System (主題研究計劃資助了此儀器的部份零件，約六十萬港元)。

The large equipment CIGS Evaporation Chamber System established by the research team at Department of Physics in The Chinese University of Hong Kong (The TRS scheme sponsored around **HK\$ 600,000** for some parts of this equipment).

CZTS 太陽能電池 CZTS Solar Cells

此外，團隊也正在研發另一種新型的 CZTS 太陽能電池。In addition, the team is also doing research work on another new type of CZTS solar cells.



團隊的另一大型實驗設施：Multi-chamber Co-evaporation System for CZTS (主題研究計劃提供了約150萬港元資助)。

Another large equipment “Multi-chamber co-evaporation system for CZTS” established by the team (The TRS scheme sponsored around **HK\$ 1.5 million** for this equipment).

旭科新能源股份有限公司 Shinetech Co., Ltd.



2015年成立
 註冊資本：
 5,200 萬元人民幣
 估計產能：每年 2 MW
 地址：浙江嘉興秀洲高新區

Established in: 2015
 Registered capital: RMB 52 million
 Estimated capacity: 2MW/year
 Location: Xiuzhou National High-tech Zone, Jiaxing, Zhejiang province, China

團隊發展的 CIGS 電池和組件科技，除了在香港中文大學組建了 CIGS 光伏系統，更於 2015 年在中國浙江省嘉興市秀洲區國家高新技術產業開發區成立了啟動公司「旭科新能源股份有限公司」，估計產能達每年 2 MW。公司現時擁有之以聚酰亞胺為基底的柔性 CIGS 薄膜太陽能電池生產線，是全中國第一、全球第二家，並擁有佔地 3,000 平方米的無塵室及 82 位員工（當中 20 位具碩博資歷）。此外，公司又獲得了嘉興市政府批准興建「省級企業研究院」及嘉興市「高新研究中心」。在 CIGS 太陽能電池研究上，團隊研發的科技取得了全球第三高的轉換效率。

The full-set technology of fabricating efficient CIGS cells and modules by the team leads to a high-efficiency CIGS PV system in CUHK, as well as a start-up company "Shinetech Co Ltd" in the Xiuzhou National High-tech Zone, Jiaxing, Zhejiang province of China since 2015, with estimated capacity 2MW/year. The company currently has the first in China, the second in world production line of flexible CIGS thin film solar panels based on polyimide substrate. The company currently has 3,000m² clean room, 82 employees (20 of them have Master of Science or PhD degrees), and has been approved to build "Provincial Enterprise Research Institute" of Zhejiang province and "High-tech R&D Center" of Jiaxing. In the field of CIGS solar cells, the R&D team achieved the third conversion efficiency in the world.



關於公司創辦人：肖旭東教授

About Prof. Xudong Xiao, Company Founder

- 博士畢業於美國加利福尼亞大學柏克萊分校 PhD degree obtained from University of California, Berkeley, USA
- 現職香港中文大學物理系教授及旭科新能源股份有限公司董事長
 Currently holds the positions of Professor, Department of Physics, The Chinese University of Hong Kong and Chairman of Shinetech Co., Ltd.
- 中國國家科學技術部「海外高層次人才引進計劃」（簡稱「千人計劃」）獲獎人 One of the awardees of the "Recruitment Program of Global Experts" (Known as the "Thousand Talents Plan"), Ministry of Science and Technology, China
- 中國國家重點基礎研究發展計畫（973計畫）首席科學家 Principle Scientist of "Major State Basic Research Development Program of China" (Known as "973 Program")
- 主領超過 40 項科研計劃，總撥款達人民幣 1 億元 Presided more than 40 scientific research projects (Funding over CNY 100 million)
- 於《科學》及其他國際知名學術期刊發表了超過150篇論文，被引用超過4,500次，H指數達35。More than 150 papers published in *Science* and other international well-known journals, cited more than 4,500 times; H factor 35.
- 申請了約 50 項技術專利，獲批達 47 項 Applied for about 50 patents, authorized 47.

公司員工 Company staff	82人 people
研發人員 Research staff	62
博士 PhD	12
碩士 Masters	8

可授權專利 Available Patents

Novel design of barrier layers for deposition of CIGS thin film solar cells on metallic substrates
 (Patent: CN201410203029.X)

System and Method for Laser Scribing a Solar Panel and the Solar Panel
 (Patents: US 15/455376 • CN 201710141357.5)

產品特長 Product Advantages

高效率 High efficiency (12 – 18%)

其他柔性產品的效率約為 8-11%. The efficiency of other company's flexible products is 8 – 11%.

輕便 Light weight

高功率：重量比（重量約為矽基太陽能電池的20分之一）
High power/weight ratio (> 0.2W/g)
(Weight is 1/20 of silicon solar cells)

可卷曲 Rollable and bendable

聚酰亞胺基底層厚度只有 0.05mm.
Polyimide substrates is as thin as 0.05mm.

穩定性極佳 Excellent stability

20年內的能量損耗只有10%. Decreased by 10% of the power in 20 years.

低損耗 Low loss

內部連接了高電壓、低電流的電池。
Battery internal series connected (high voltage, low current)

用途廣泛 Wide application range

外型時尚美觀，而且不受溫度影響。
Fashionable and with attractive appearance, excellent temperature resistance.

卷軸式薄膜太陽能充電寶 Rollable Thin Film Solar Power Bank



顏色 Color :



重量 Weight : 218g

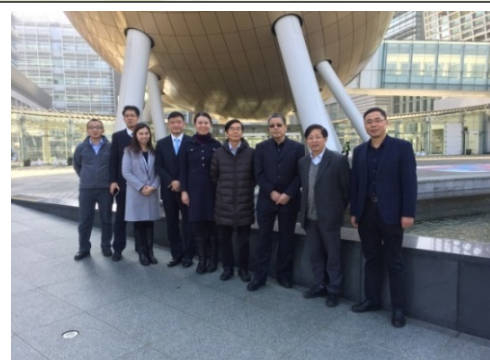
尺寸 Size : 直徑 Diameter 30mm x 長 Length 190mm
輸出電壓 Output Voltage : 5.0V
輸出電流 Output Current : 2.0 A
電池容量 Battery Capacity : 4,800 mAh

關於「秀洲高新區」

About the “Xiuzhou National High-tech Zone”

嘉興秀洲高新技術產業開發區（簡稱秀洲高新區）位於嘉興市西側，2006年被批准為省級開發區。2015年9月，國務院正式同意秀洲高新區升級為**國家高新技術產業開發區**。經過十多年的發展，秀洲高新區已成為嘉興市經濟轉型升級的重要基地。2017年8月，首次參與國家高新區排名的秀洲高新區，綜合排名進入全國前二分之一佇列，排名居**全國所有新升級的國家高新區首位**。

The “Xiuzhou National High-tech Zone” (the Zone) is located at the west of the Jiaxing prefecture of Zhejiang province, China, which was approved to be a province-level development zone in 2006. In Sep 2015, the State Council approved the Zone to be upgraded to a **National High-tech Industrial Development Zone**. After the developing for more than 10 years, the Zone now becomes an important base for economic transformation and upgrade in Jiaxing. In Aug 2017, the Zone joined the National high-tech zone ranking in China for the first time, and its overall ranking entered the first half nationally, and is the **highest rank among all newly upgraded national high-tech zones**.



2017年12月19日，嘉興市政府五位嘉賓（嘉興市政協副主席柴永強、嘉興學院院長盛頌恩、秀洲區委書記吳炳芳、嘉興學院社會處長袁志明、秀洲國家高新區主任嚴加友）蒞臨訪問尚教授設於中大的研究設施，並到訪香港科技園。

Five guests from the Jiaxing government visited R&D facilities of Prof. XD Xiao at CUHK as well as The Hong Kong Science Park on 19 Dec 2017.

更多項目資訊
More information

