THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

用於產生電能的可擴展全紡織能量收集器

Scalable All-Textile Energy Harvesters for Electric Power Generation

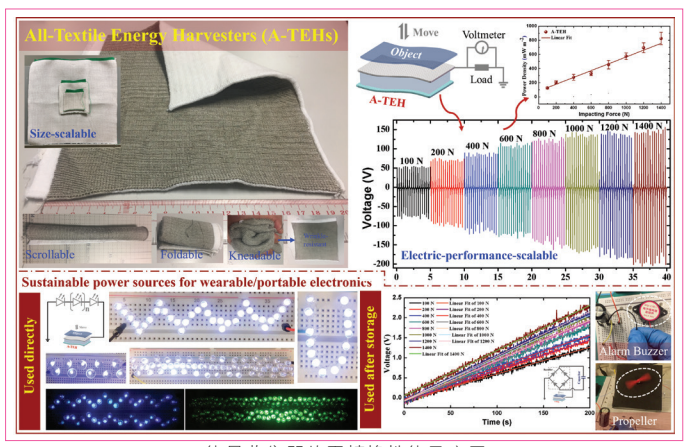
能夠收集並轉化機械能為電能的優質紡織物

High quality textiles that can harvest mechanical energy and convert it into electrical energy

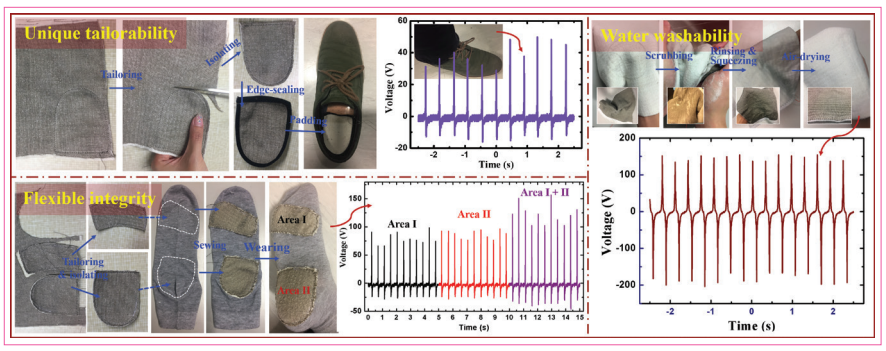
理大利用導電物料，通過創新的織物結構設計，研發出紡織物能量收集器。它能夠產生電力，其性能比同類產品更為優異。

此能量收集器具備織物的所有優良性能和特性，包括可穿著性能、可洗性、透氣性、熱舒適性、耐用性、柔軟性，亦可調整生產尺碼比例及剪裁成任何形狀。同時，它可收集環境中被廣泛浪費的各種機械能，如步行時所產生的能量，並將其轉化成電能。它亦可用作可穿戴設備的可連續持久使用的獨立電源，並且不受天氣條件的限制。

此該能量收集器可用市場上的商業紡織機器加工而成，生產成本低。它在可持續能源發展和真正可穿戴電子設備方面有著巨大的應用及市場潛力。



能量收集器的電轉換性能及應用
The electrical performance and applications of the energy harvester



能量收集器可裁剪成任何形狀大小、可清洗及晾乾而不會影響其電轉換性能
The energy harvester is tailorable into any shapes and sizes, it is also washable and air dryable without affecting its electrical conversation performance

PolyU's textile energy harvester is developed based on innovative structural design of energy harvesting materials. It fully integrates clean and sustainable electric energy generating functions within fabric structures, and exhibits better electric performance among similar products.

The energy harvester retains all excellent properties and characteristics of fabric, including wearability, washability, breathability, thermal comfort, durability, super-flexibility, light weight, size scalability and tailorability into different shapes. The textile energy harvester can harvest mechanical energies broadly wasted in the environment, e.g. energy generated during walking, and convert them into electricity. It also works as an independent and continuous energy source without restrictions of weather conditions for wearable devices.

Moreover, the energy harvester can be economically fabricated with commercial textile machines. It shows enormous application and market potentials in the areas of sustainable energy development and truly wearable electronics.

Principal Investigator

Dr Bingang XU

Institute of Textiles and Clothing

Contact Details

Institute for Entrepreneurship

Tel: (852) 3400 2929 Fax: (852) 2333 2410 Email: pdadmin@polyu.edu.hk

Access More info via mobile

Note: Subject to data charges by mobile operators

專利申請編號: 201810095684.6 (中國)

特色與優點

- 可持續發展：可作為連續和持久使用的獨立電源，並且不受天氣條件的限制
- 優良性能：轉化電能的性能優越，而且耐用
- 舒適性：具備紡織品的結構和所有特性,例如輕巧、柔軟、方便儲存、運輸和安裝
- 可裁剪及可擴展性：可調整生產尺碼或裁剪成任何形狀大小
- 可水洗：可像普通織物一樣清洗及晾乾，而不會影響其電轉換性能
- 可商業化：可用現有工業機器加工生產，實現大規模工業生產和商業化

應　用

- 便攜式和可穿戴式電子設備的柔性電源系統，如LED顯示、助聽器、健身動作捕捉器、傳感器等
- 規模化產能，例如可以廣泛布設於人行道和機動車道等場合用於規模化產電
- 作為充電的電源與儲能設備，如電容器和電池等
- 自供電傳感系統，進行健康保健和監測，例如用於睡眠監控的動靜傳感智能床墊和具有路線捕捉功能的智能地毯等
- 可融入其他電子設備的自供電紡織平臺，比如作為全織物柔性電路、與互動式智能紡織品

獎　項

第46屆瑞士日內瓦國際發明展 - 評判特別嘉許金獎 (2018年4月)

Patent Application No.: 201810095684.6 (China)

Special Features and Advantages

- Sustainable in energy harvesting, as an independent and continuous energy source without restrictions of weather conditions
- Efficient in energy conversion and durable
- Comfortable that possess full textile structures, properties and characteristics e.g. lightweight and super-flexible, easy for storage, transportation and installation, etc.
- Tailorable and scalable into any shapes and sizes
- Washable and can be air-dried like ordinary fabrics without affecting its electrical performance
- Commercializable: can be fabricated using existing industrial machines and thus have a huge potential for industrial mass production and commercialization

Applications

- Wearable power sources for driving portable and wearable devices, e.g. LED display, hearing aid, fitness tracker, wearable sensor
- Large-scale power sources, e.g. energy-generating carpet that can generate electrical power when people walk or vehicles move over it
- Energy harvesters for energy storage devices, e.g. capacitor or battery
- Self-powered sensing systems for healthcare and monitoring, e.g. sleep-monitoring mattress, motion-tracking carpet
- Self-powered textile platform incorporated into desired electronics, e.g. fabric circuit board, smart and interactive garment

Award

Gold Medal with the Congratulations of Jury – 46th International Exhibition of Inventions of Geneva, Switzerland (Apr 2018)

5_ITC_37_0218