Transparent and flexible battery for power generation and storage

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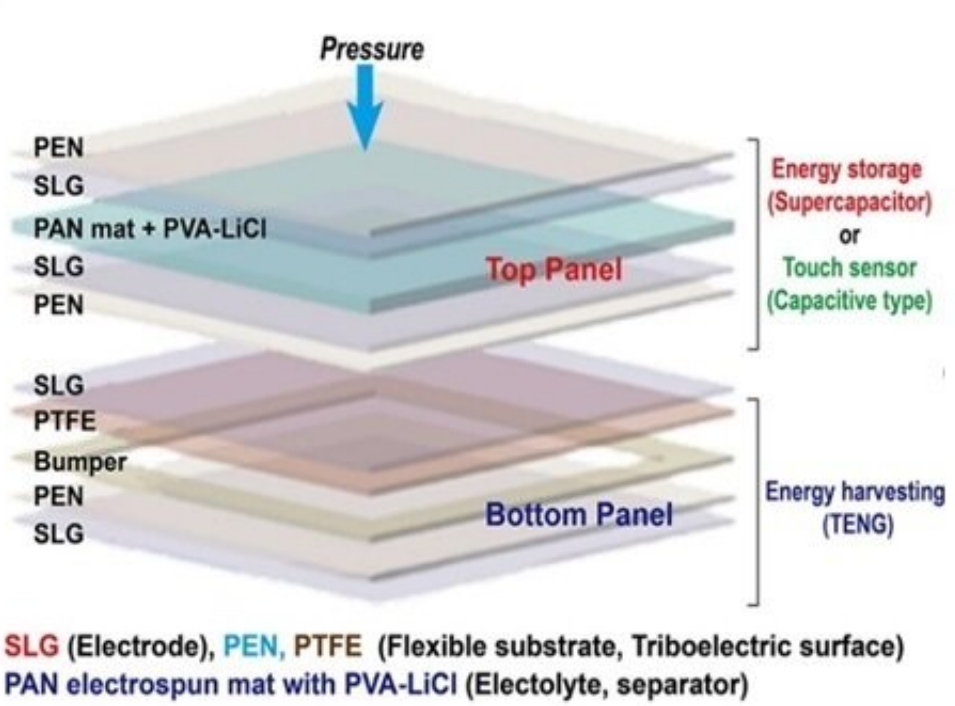


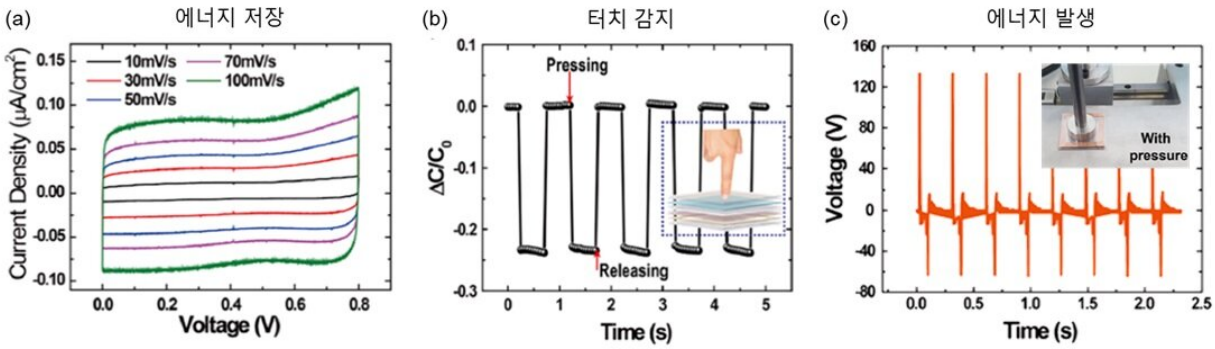
Concept map of transparent energy devices. Credit: DGIST

Various uses of electronics and skin-attachable devices are expected with the development of a transparent battery that can both generate and store power. DGIST announced on Tuesday, April 23 that Senior Researcher Changsoon Choi's team in the Smart Textile Research Group have developed film-type, graphene-based multifunctional transparent energy devices.

Senior researcher Changsoon Choi's team actively used single-layered graphene film as electrodes in order to develop transparent devices. Due to its excellent electrical conductivity and light and thin characteristics, single-layered graphene film is perfect for electronics that require batteries. By using a high-molecule nano-mat that contains a semisolid electrolyte, the research team increased transparency (maximum of 77.4 percent) to see landscape and letters clearly.

Furthermore, the research team designed a structure for self-charging electronic devices by inserting the energy storage panel inside the upper layer of power devices, and the energy conversion panel inside the lower panel. They also manufactured electronics with touch-sensing systems by adding a touch sensor right below the energy storage panel of the upper layer.

Senior researcher Changsoon Choi in the Smart Textile Research Group, the co-author of the paper, said, "We decided to start this research because we were amazed by transparent smartphones appearing in movies. While there is still a long way to go for commercialization due to high production costs, we will do our best to advance this technology further."



(from left) Graph on the electrochemical performance of energy storage (first),

Graph on capacitance change according to touch (second), Graph on electric power when pressure is given (third). Credit: DGIST

More information: Sungwoo Chun et al, Single-Layer Graphene-Based Transparent and Flexible Multifunctional Electronics for Self-Charging Power and Touch-Sensing Systems, *ACS Applied Materials & Interfaces* (2019). DOI: 10.1021/acsami.8b20143