Gwangju Institute of Science and Technology
Official Press Release (https://www.gist.ac.kr/)

Section of Public Relations	Hyo Jung Kim Section Chief (+82) 62-715-2061	Nayeong Lee Senior Administrator (+82) 62-715-2062
Contact Person for this Article	Professor Gun Young Jung School of Materials Science and Engineering 062-715-2320	
Release Date	2020.08.13	

Professor Gun Young Jung's research team develops a triboelectric element that lights up when the wind blows

☐ GIST (Gwangju Institute of Science and Technology, President Kiseon Kim) School of Materials Science and Engineering Professor Gun Young Jung's research team has developed a high-performance triboelectric element using wind, an eco-friendly next-generation renewable energy source. Since it can supply energy continuously, it is expected to be used as an auxiliary power supply for drones and electric vehicles.

- The triboelectric element developed in this study produces electricity by using the kinetic energy of the wind, so it has the advantage of no pollution and low maintenance costs, and it is possible to convert to a self-generation paradigm by continuously supplying necessary energy.

☐ The research team inserted a metal layer connected to the lower electrode between the dielectric* films to improve the electrostatic induction** by the charged dielectric. By configuring the upper electrode in the upper-bottom dual mode, a wind-based triboelectric element having a structure capable of two frictions during one vibration cycle was fabricated.

* dielectric: A material that does not conduct electricity well. Unlike conductors, dielectrics do not allow electric charges to pass through, but negative charges of dielectrics increase for positive charges and positive charges of dielectrics increase for negative charges, resulting in polarity.

** electrostatic induction: When an object charged with positive or negative charges approaches a conductor, free electrons move and the same positive and opposite charge is induced on the surface of the conductor.

- Existing wind-based triboelectric devices are difficult to commercialize because they have a lower current value than voltage. The research team confirmed the characteristics of the production power density of more than 10 times by inserting a metal between the dielectrics, increasing the current by about 12 to 15 times. (Production power density: 3.28 mW/cm^2)

□ The researchers succeeded in demonstrating this research achievement by supplying power to a 'GIST' LED logo, demonstrating the possibility that energy supplied by using triboelectric elements is one step closer to daily use.

- In addition, the research team identified effective contact friction between the film and electrodes, which flutters over 400 Hz in the wind, through a high-speed camera. Accordingly, the electrical mechanism of the motion for the dielectric film was completely analyzed.

□ Professor Gun Young Jung said, "This research presents the potential to overcome the low power and stability problems of current wind-based triboelectric devices. In the future, it is expected that this can be applied in various ways not only to low-power devices (sensors, displays, etc.) in places that are difficult to access, such as on the outside high-rise buildings, but also as auxiliary power devices of electric vehicles and drones."

□ GIST Professor Gun Young Jung led the research, which was conducted by Ph.D. student Sungjun Cho (co-first author) and master's student Yoseop Shin (co-first author), with support from the National Research Foundation of Korea and the GIST Research Institute and was published on July 25, 2020, in Nano Energy, a renowned international journal in the field of energy.

⌘