



Gwangju Institute of Science and Technology

Official Press Release — <https://www.gist.ac.kr>

Section of Public Relations	Dongsun Cho Section Chief 062-715-2061	Nayeong Lee Senior Administrator 062-715-2062
Contact Person for this Article	Professor Young Min Song School of Electrical Engineering and Computer Science 062-715-2655	
Release Date	2021.03.15	

Professor Young Min Song's research team develops wearable electronic devices to solve the heat problem of smart watches

- Researchers in Korea have developed a patch-type wearable healthcare electronic device that will solve the heat problem of wearable devices such as smart watches.
 - GIST (Gwangju Institute of Science and Technology, President Kiseon Kim) School of Electrical Engineering and Computer Science Professor Young Min Song's research team developed a thermally stable wearable electronic device by integrating a flexible photoelectric device and a heat dissipating material that lowers the temperature of an object without an external power source.
- Smartwatches that have health management functions such as blood pressure and electrocardiogram measurements are attracting more attention as the establishment of a non-face-to-face treatment system has emerged as a hot topic after the COVID-19 pandemic, but fire hazards caused by smart watches is creating controversies.
 - To prevent such accidents in wearable electronic devices such as smart watches, a method of dissipating heat generated in the device is generally managed by inserting a thin metal heat sink inside. However, although this



method has inferior cooling efficiency, a metal heat sink that reduces the flexibility of the entire wearable electronic device and interferes with wireless power and data transmission/reception cannot be a suitable cooling solution.

- Professor Young Min Song's research team developed a flexible and very thin radiative cooling material* without metallic materials that is capable of cooling the temperature of a device without using energy.

* radiative cooling material: a cooling material that lowers the ambient temperature without external power supply by emitting long-infrared rays through radiation

- The developed radiation cooling material is made of a polymer that is harmless to the human body and contains nano/micro-sized pores of various sizes that strongly reflect sunlight (more than 97%) and emit internal heat in the form of electromagnetic waves. In addition, unlike conventional radiative cooling materials that require a well-reflective layer of sunlight, such as silver and aluminum, this method can operate without metal, making wireless power and data transmission of wearable electronics completely unimpeded.
- Professor Young Min Song said, "If the research on wearable electronic devices to date has focused on improving mechanical characteristics and functionality, the heat control problem of wearable electronic devices should be improved in the future. Wearable electronic device platforms with porous polymer-based radiative cooling materials can overcome existing technical limitations."
- GIST Professor Young Min Song led the research, which was conducted by Min Hyung Kang Gil Ju Lee as co-first authors with support from the National Research Foundation of Korea, the Korea Institute of Energy Technology Evaluation and Planning, the Ministry of Trade, Industry and Energy of the Republic of Korea, and by the GIST Research Institute, and was published online on March 9, 2021, in the international academic journal *Advanced Science*.

