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Professor Heung Cho Ko's research team develops  
printing technology that can attach electronic  
devices to rough surfaces, like rocks  
(Ministry of Science and ICT)


- The Ministry of Science and ICT (Minister Youngmin You) announced that Professor Heung Cho Ko's research team at the Gwangju Institute of Science and Technology (GIST, President Kiseon Kim) has developed a printing technology that can attach electronic devices to uneven surfaces.
- The work, which was conducted in collaboration with Professor Gun Young Jung, was published on September 3, 2019, in ACS Nano, a prominent nanoscience journal.

※ Title: Enhancement of Interfacial Adhesion Using Micro/Nanoscale Hierarchical Cilia for Randomly Accessible Membrane-Type Electronic Devices

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- The surface of most objects, including natural objects, is not generally flat, making it difficult to manufacture or attach high-performance and highly integrated electronic devices.
  - The use of chemicals should be minimized when attaching electronic devices to environmentally friendly objects such as stones, leaves, or egg shells.
  
- Professor Heung Cho Ko's research team introduced a tubular nano cilia structure on the underside of the substrate for electronic devices that can be freely attached to uneven surfaces.
  - The tubular nano cilia have features that attach flatly to the surface curvature after the transfer printing, creating a large contact area and greatly increasing the adhesion between the electronic device and the surface.
  
- Furthermore, it formed a layer structure consisting of film-type micro cilia and tube-shaped nano cilia (hereinafter referred to as micro-nano cilia hierarchy). This allowed transcription printing on a wider range of surfaces.
  - The research team formed the tubular polymer nano cilia could be formed by using anodized aluminum as a framework.

- The micro-nano cilia layer structure was fabricated using a porous anodized aluminum with anodized pattern. If a high-performance electronic device is mounted on a polymer thin film substrate having this structure and a transfer printing process is performed, the electronic device can be eco-friendly and bio-friendly on an uneven surface.
- Professor Heung Cho Ko said, "This achievement is a technology that enables high-performance transfer devices to be adhered to various surfaces such as eggs and stones. It will be used in various fields such as nutritional monitoring of agricultural products and natural environment monitoring."
- For real applications, it is expected to be used in a variety of fields, such as attaching a temperature sensor to an egg shell to identify freshness or attaching a sensor to a stone to monitor natural environments.
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