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2020/2021 (GENAP)

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26-May-2021

Dear Dr Firdaus:

TITLE: Mechanically and electrically durable, stretchable electronic textile for robust wearable electronics
AUTHORS: Kim, Sun Hong; Kim, Yewon; Choi, Heewon; Park, Juhyung ; Song, Jeong Han ; Baac, Hyoung Won; Shin, Mikyung; Kwak, Jeonghun; Son, Donghee
(See below for abstract)

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Yours sincerely,

Prof Abha Misra
Associate Editor, RSC Advances

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ABSTRACT:
A monolithic integration of high-performance soft electronic modules into various fabric materials has enabled a paradigm shift in wearable textile electronics. However, the current textile electronics has struggled against fatigue under repetitive deformation due to absent of materials and structural designs strategies for imparting electrical and mechanical robustness to individual fibers. Here, we report a mechanically and electrically durable, stretchable electronic textile (MED-ET) enabled by a precisely controlled diffusion of tough self-healing stretchable inks into fibers and an adoption of the kirigami-inspired design. Remarkably, the conductive percolative pathways in the fabric of MED-ET even under harshly deformed environment were stably maintained due to electrical recovery phenomenon which originates from the spontaneous rearrangement of Ag flakes in the self-healing polymer matrix. Specifically, such unique property enabled damage-resistant performance when repetitive deformation and scratch were applied. In addition, kirigami-inspired design was capable of efficiently dissipating the accumulated stress in conductive fabric during stretching, thereby providing high stretchability (a tensile strain of 300%) without any mechanical fracture or electrical malfunction. Finally, we successfully demonstrate various electronic textile applications such as stretchable micro-light-emitting diodes (Micro-LED), electromyogram (EMG) monitoring and all-fabric thermoelectric devices (F-TEG).

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