Bio-Inspired Stretchable Electrodes

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Stretchable conductive metallic structures are essential elements in the development of stretchable electronics. Current progress in this field has been mostly focused on man-made materials and structures for achieving high conductivity and high tensile strains. On the other hand, there are many natural structures that show inherently good stretchability, but they are not electronically conductive. This talk will discuss our latest development of stretchable metal electrodes (either opaque or transparent) on the basis of biologic al templates. Two particular examples will be discussed in detail. The first one is the fabrication of highly stretchable opaque metal electrodes and interconnects, namely "Electronic Petals (E-petals)", which make use of the topographical micro/nano structures of rose petals to enable superb stretchability to metal thin films. The second example is the fabrication of stretchable transparent electrodes, namely "Vein-based Transparent Electrodes (VTEs)", by chemical deposition of metal on natural veins of leaves. We demonstrate that these bio-inspired electrodes possess remarkable electro-mechano-opto properties that outweigh most best-performing man-made ones.
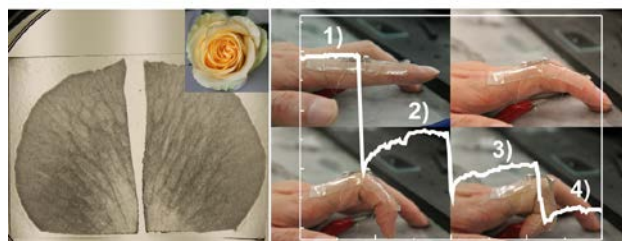

Fig. 1. E-petals (left) used for electronic skins (right).

Fig. 2. VTEs made on natural veins.

References
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