

Applications of Wrinkled Elastomeric Microstructures for Flexible E-Skin Devices

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E-skins have recently been extensively investigated for development of highly advanced human-interactive devices, such as flexible sensor and skin-attachable electronics. To develop these devices, it is necessary to have sufficient flexibility and stretchability characteristics of each component constituting the wearable e-skin devices. Herein, we introduce the studies on the developments of flexible/stretchable transistor or piezocapacitive pressure sensor by using polymer template with wrinkled microstructure, which is ultimately applicable to the e-skin devices. The wrinkled microstructures were formed in various ways such as the exposure of PDMS to UV-ozone ambient, the PDMS/parylene-C double layer, and the blending of two polymers with different hardness properties. As the results, we confirmed that the sensitivity to the external pressure changes can be greatly improved when the elastomeric template having the wrinkled microstructures was applied to the flexible pressure sensor. In addition, the wearable organic transistors have been also developed that maintain the stable electrical performances for up to 40% stretching by using the wrinkled elastomeric polymer templates.