Stretchable Electroluminescent Displays based on Facile Patterning Method for Silver Nanowires

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**Abstract**

Silver nanowires (AgNWs) has received significant attentions due to their excellent electrical conductivity, high optical transparency, and superior mechanical strength. Various individual AgNWs-based devices (e.g., artificial skin devices, strain sensors, light emitting devices, displays, heaters) and flexible applications have been demonstrated. Among these devices, the stretchable electroluminescent (EL) devices have been concened by both academia and industry because of their potential applications in display and solid-state lighting. However, the practical applications of AgNWs require patterned electrodes instead of fully coating. In this work, an effective patterning method of AgNWs was developed by combining vacuum filtration with screen printing. The prepared AgNWs film was transferred to Polydimethylsiloxane (PDMS) film to fabricate the patterned transparent conductive films (TCFs) (Fig 1a). To confirm the potential applications, we demonstrated the intrinsically stretchable alternating current EL devices based on the patterned TCFs. The emission intensity decreased only by 2.8% as the device at strain of 70% (Fig 1d). Various luminescent patterns were fabricated easily. The flexible and stretchable TCFs shows great application prospects in smart displays and wearable electronics[1].

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Figure 1: a) Photograph of the patterned TCFs. b) Transmittance spectra of the TCFs with different sheet resistance. c) Photograph of the ACEL with the luminescent pattern maple. d) The luminance change of the ACEL device under different stretching strains.

References

[1] J. H. Koo, D. C. Kim, H. J. Shim, T. H. Kim and D. H. Kim, Flexible and Stretchable Smart Display: Materials, Fabrication, Device Design, and System Integration. Adv. Funct. Mater., 2018, 28, 1801834.