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Graphene Hybrid Stretchable Electrode-Based Alternating-Current Electroluminescent Device

Stretchable alternating-current electroluminescent (ACEL) devices are required due to their potential in wearable, biomedical, e-skin, robotic, lighting, and display applications; however, one of the main hurdles is achieving uniform electroluminesence, demanding an optimal combination of transparency, conductivity, and stretchability in electrodes.[1] We therefore propose a fabrication scheme involving strategically combining two-dimensional graphene layers with a silver nanowires (Ag NWs) embedded PEDOT: PSS film. The developed hybrid electrode overcomes the limitations of commonly known metallic NWs and ionic conductor-based electrodes for ACEL applications.[2,3] Furthermore, the potential of the hybrid electrode is realized in demonstrating large-area stretchable ACEL devices composed of an 8 × 8 passive array. The prototype ACEL passive array demonstrates efficient and uniform electroluminescence under high levels of mechanical deformation such as bending, rolling, twisting, and stretching.

References

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Figures

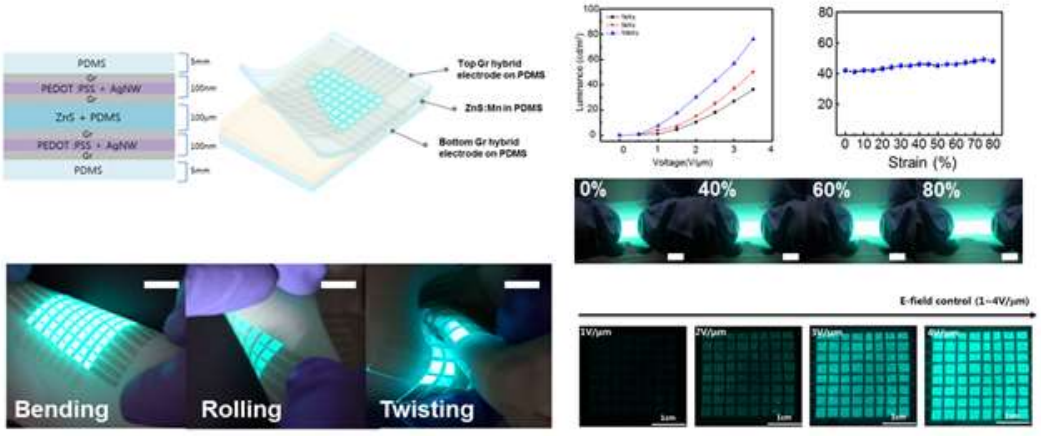

Figure 1: The structure of stretchable ACEL device and its electrical/mechanical characteristics under various mechanical deformations.