VIDEO ARTICLE

Vid. Proc. Adv. Mater., Volume 2, Article ID 2108209 **(2021)**

Graphene Application for OLED Display

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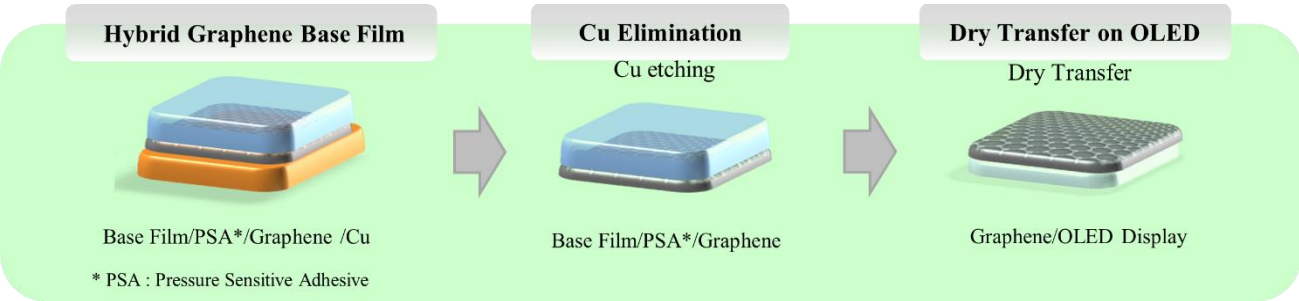
DOI: 10.5185/vpoam.2021.08209

Graphical Abstract



Abstract

Graphene material has been promising material for flexible optoelectronic devices because of its promising material properties. Several research groups have demonstrated potentials of graphene for various flexible devices such as touch-screen sensors, organic light-emitting diodes and organic photovoltaic devices [**1**]. However, Graphene material still has some hurdles to overcome for the success of commercialization in display industry.

From the commercial perspective, I'd like to report our achievements on probable application fields of graphene for OLED displays. Specifically, I want to highlight the application of graphene as a transparent electrode for OLED displays because of its superior optical, mechanical and electrical material properties. In addition, I'd like to demonstrate flexible OLED lighting device using graphene materials as one of the encapsulation layers which have great potentials for the application of flexible OLED encapsulation. Through this work, we are able to confirm the possibility that the unique mechanical flexibility combined with barrier property of graphene could replace inorganic materials which have been widely used in OLED encapsulations. We use the dry transfer coating of the graphene barrier films on OLED device on flexible substrate at room temperature using a roll-to-roll process which can be widely used to protect various light emitting materials for next generation displays. I also briefly mention other possible application fields of graphene for OLED display.

In addition, I'd like to suggest some requirements and specifications of graphene material for OLED display application. In order to achieve the real commercialization of graphene for next generation OLED displays, Graphene material must overcome some hindrances such as graphene's film quality after transferring, poor adhesion, impurity control of graphene film fabrication, higher sheet resistance.

Keywords: Graphene material; OLED Display; OLED electrode; OLED encapsulation; commercialization of graphene.

References

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Biography of Presenting Author

J.H. Park received the B.S., M.S. degrees from Seoul National University, Seoul, Republic of Korea in 1997,1999 and Ph.D. degree from University of Connecticut, Storrs, United States of America in 2010, respectively, all in Polymer Science. From 2010 to 2020, he was a chief research engineer at LG Display Foundation Technology Research Laboratory. He currently serves as a senior manager at LG Display Corporate Strategy Group. He won the Minister of Trade, Industry and Energy Award from Republic of Korea for contribution to enhancing national competitiveness of OLED display through the development of original next-generation OLED display technology in 2019. He has expertise in the research and development on bendable OLED TV, wearable OLED smart watch and flexible/foldable OLED pad and related business developments. So far, he has authored and co-authored more than 20 papers which include the cover papers in Advanced Functional Materials and Advanced Energy Materials and filed/registered over 40 patents. He has served as one of the technical program committee and the chairman of emerging display materials session in IMID (International Meeting on Information Display) 2018, 2019 and 2021. His current research interests encompass functional electronic materials and their applications to optical devices (i.e., OLEDs, micro-LEDs, OPVs) with bendable, foldable and stretchable properties.

Citation of Video Article

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