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Flexible and Transparent Field Emission Devices based on Graphene-Nanowire Hybrid Structures MUHAMMAD ARIF, KWANG HEO, BYUNG YANG LEE, Department of Physics and Astronomy, Seoul National University, Seoul, Korea, DAVID H. SEO, SUNAE SEO, Semiconductor Devices Lab., Samsung Advanced Institute of Tech., Yongin-Si, Gyeonggi-do, Korea, JIKANG JIAN, Department of Physics, Xinjiang University, Xinjiang 830046, P. R. China, SEUNGHUN HONG, Department of Physics and Astronomy, Seoul National University, Seoul, Korea — Recent developments in wafer scale synthesis and transfer of graphene have made it possible to fabricate electrodes for versatile flexible devices. However, a flexible and transparent graphene-based field emission device has not been explored yet. Herein, we report the fabrication of flexible and transparent field emission devices based on graphene-nanowire hybrid structures. In this work, we successfully grew vertically-aligned Au nanowires on graphene surface using an electrochemical method and utilized it as a cathode. We also utilized a graphene electrode for an anode resulting in a transparent and flexible field emission device. Our field emission devices can be bent down to 22 mm radius of curvature without any significant change in its field emission currents. This flexible and transparent field emission device based on graphene-nanowire hybrid structures will utilized for various applications such as field emission displays, x-ray tubes, and pressure sensors.

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