SB-5

그래핀과 2차원 나노물질의 마찰특성

이창구†

성균관대학교

(peterlee@skku.edu†)

원자 한층 또는 수층의 두께를 가진 그래핀과2차원나노물질들은 그들의 적층형태의 3차원 물질들과는 두드러지게 다른 전기적, 전자적, 광학적, 화학적, 기계적 성질을 지닌다. 그래핀은 탄소원자들간에 sp2공유결합을 형성하여 뛰어난 기계적, 윤활적 특성을 가지고 있으며, 이황화몰리브덴 또한 좋은 윤활적 특성을 가지고 있다. 본 발표에서는 원자현미경을 이용해서 그래핀, 이황화몰리브덴, 질화붕소, 니오븀 다이셀레나이드 등의 원자 두께 수준의 2차원 나노물질들에서 나타나는 특이한 마찰적 특성들을 보고한다. 특별히 원자수준으로 얇아짐으로 두께에 따른 마찰력의 변화와 2차원물질의 주름에 따른 방향성있는 마찰특성 그리고, 기판에 따른 마찰력의 특성변화를 보고하도록 한다.

Keywords: 그래핀, 2차원 나노물질, 원자현미경, 마찰

SB-6

Flexible Organic Light-Emitting Diodes Using Modified Graphene Anodes

한태희, 이영빈*, 최미리, 우성훈, 배상훈*, 홍병희**, 안종현*, 이태우†

POSTECH; *성균관대학교; **서울대학교

(twlee@postech.ac.kr†)

Graphene films have a strong potential to replace indium tin oxide anodes in organic light-emitting diodes (OLEDs), to date. However, the luminous efficiency of OLEDs with graphene anodes has been limited by a lack of efficient methods to improve the low work function and reduce the sheet resistance of graphene films to the levels required for electrodes. Here, we fabricate flexible OLEDs by modifying the graphene anode to have a high work function and low sheet resistance, and thus achieve extremely high luminous power efficiencies (37.2 lm/W in fluorescent OLEDs, 102.7 lm/W in phosphorescent OLEDs), which are significantly higher than those of optimized devices with an indium tin oxide anode (24.1 lm/W in fluorescent OLEDs, 85.6 lm/W in phosphorescent OLEDs). We also fabricate flexible white OLED lighting devices using the graphene anode. These results demonstrate the great potential of graphene anodes for use in a wide variety of high-performance flexible organic optoelectronics.

Keywords: Graphene anode, OLED, Work Function Tuning, Solid State Lighting

SB-7

High-Performance Flexible Graphene Field Effect Transistors with Ion Gel Gate Dielectrics

조정호†

성균관대학교 나노과학기술원

(jhcho94@skku.edu†)

A high-performance low-voltage graphene field-effect transistor (FED array was fabricated on a flexible polymer substrate using solution-processable, high-capacitance ion gel gate dielectrics. The high capacitance of the ion gel, which originated from the formation of an electric double layer under the application of a gate voltage, yielded a high on-current and low voltage operation below 3 V. The graphene FETs fabricated on the plastic substrates showed a hole and electron mobility of 203 and 91 cm^2/Vs, respectively, at a drain bias of - I V. Moreover, ion gel gated graphene FETs on the plastic substrates exhibited remarkably good mechanical flexibility. This method represents a significant step in the application of graphene to flexible and stretchable electronics.

Keywords: graphene, ion gel, flexible electronics, field effect transistor, low-voltage operation