NT-001

Entangled-Mesh Graphene for Highly Stretchable Electronics

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While conventional electronic devices have been fabricated on the rigid and brittle Si based wafer as a semiconducting substrate, future devices are increasingly finding applications where flexibility and stretchability are further integrated to enable emerging and wearable devices. To achieve high flexibility and stretchability, various approaches are investigated such as polymer based conducting composite, thin metal films on the polymer substrate, and structural modifications for stretchable electronics. In spite of many efforts, it is still a challenge to identify a solution that offers both high stretchability and superior electrical properties. In this paper, we introduce a highly stretchable entangled-mesh graphene showing a potential to address such requirements as stretchability and good electrical performance. Entangle-mesh graphene was synthesized by CVD graphene on the Cu foil. To analyze the mechanical properties of entangled-mesh graphene, endurance and stretching tester have been used.

Keywords: Stretchable Electronics, Flexibility, Entangled-Mesh Graphene

NT-002

Excitation Energy Induced S-shaped PL behavior in Graphene Quantum Dots

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Graphene quantum dots (GQDs) have attracted much attention because of various advantages such as cost-effectiveness of synthesis, low toxicity, and photostability. The origins of photoluminescence (PL) in GQDs were suggested as the intrinsic states for localized sp2 carbon domains and the extrinsic states formed by oxygen-functional groups.[1,2] Nevertheless, it is still unclear to understand the information of electric band structure in GQD. Here, we observed excitation energy induced S-shaped PL behavior. The PL peak energy position shows an S-shaped shift (redshift-blueshift-redshift) as function of the excitation wavelengths. From various samples, we only observed S-shaped PL shift in the GQDs with both luminescent origins of intrinsic and extrinsic states. Therefore, this S-shaped PL shift is related to different weight of intrinsic and extrinsic states in PL spectrum depending on the excitation wavelengths. This would be the key result to understand the electric band structure of the GQDs and its derivatives.

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