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4 - 30 Charge State Effect on Raman Spectra of Graphene Irradiated with Highly Charged Ion*

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Graphene is two dimensional materials which is made of honeycombed carbon atoms. It attracts extensive interests for its wonderful characteristics that make the graphene a potential candidate in fields of microelectronics production, molecule detection, desalination and DNA sequencing. Highly charged ion (HCI) has huge potential energy for peeling off electrons. When interacting with solid surface, the HCI distorted the solid lattice via potential deposition and then the nanostructures were formed on the solid surface. The HCI was expected as a tool for surface modification. In this work, HOPG and grapheme were irradiated with Xe^{q+} and Ar^{q+} ions. The typical Raman spectra of graphene and HOPG irradiated with highly charged ions were shown in Fig. 1. The D peak appeared at 1 335 cm^{-1} on the spectra of graphene irradiated with highly charged ions. The intensity of D peak increased with fluence. The ratio of intensity of D peak to that of G peak varied with fluence in Fig. 2. The ratio rose linearly with the square root of fluence when fluence was low. The ratio saturated when the irradiation fluence was high. The critical fluence depended on the charge state of ion. The higher charge state it was, the lower critical fluence it would be.

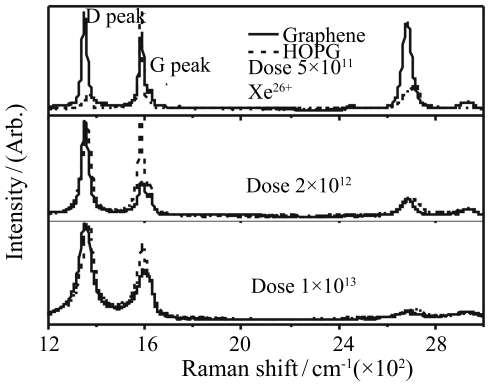

Fig. 1 The Raman spectra of graphene and HOPG irradiated by Xe^{26+}ions.

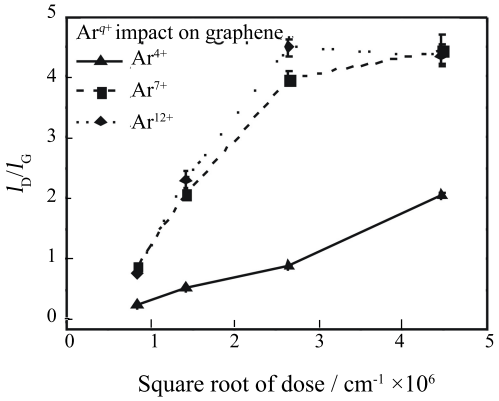

Fig. 2 The ratio of D peak to G peak versus the square root of fluence.

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