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Catalyst-free growth of nanographene and its application

DONGXIA SHI, WEI YANG, DONGHUA LIU, RONG YANG, GUANGYU ZHANG, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China — A new method was developed to synthesis graphene films on various substrates without catalyst at low temperature, which was performed using our home-made remote plasma enhanced chemical vapor deposition system (r-PECVD). The fabricated graphene film is composed of nanographene islands with hexagonal shape and size of several hundred nanometers. Through the adjustment of temperature, the nucleation and growth were fully controlled, in this way, nanographene films with expected crystal size and layers can be obtained. Furthermore, the fabricated nanographene films was also investigated in strain sensors, which shows ultra-sensitive properties with the highest gauge factor over 300 so far for graphene-based strain sensors. The piezoresistive characteristics of nanographene films are based on charge tunneling from neighboring nanographene islands. Besides strain sensors, this simple and scalable graphene fabrication also provides a potential way in many applications fields, such as electrode materials, transparent conductive films, thin film resistors, gas sensors and so on.

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