

Preparation of multi-layer graphene sheets and their applications for particle accelerators

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Particle accelerators have found wide success in physical, biological, and medical applications. Key elements in these accelerators are charge stripping foils for adjusting ion charge for good acceleration, and ion beam sensors for intensity distribution measurements. Conventional metal foils used for such purposes, however, have suffered from their low lifetime under high intensity ion beam irradiation. Here we introduce multi-layer graphene sheets as highly durable ion beam charge stripping foils and ion beam sensors.

Multi-layer graphene sheets of 3 μm – 100 nm thickness were prepared by heat treatment of polymer films at temperatures above 3,000 oC. The sheets consist of highly-orientated graphite layers with good mechanical robustness. Key features of these sheets include their high electrical conductivity and thermal conductivity in the in-plane direction.

The sheets exhibit greater durability and lower energy loss relative to metal foils. A number of applications are currently being explored, and some examples include, particle accelerator related materials and thermal interface materials.

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