

Macroscale Tribological Properties of Fluorinated Graphene

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Highlights

- The multilayer and monolayer graphene surfaces were successfully modified with fluorine using the bipolar PBII.
- The durability of graphene increased by the fluorine plasma treatment due to the transfer layer on counter material, which is a mixture of fluorinated graphene and amorphous carbon.
- The friction coefficient of multilayer graphene decreased by the fluorine plasma treatment.
- The friction coefficient of monolayer graphene increased by the fluorine plasma treatment due to the increase of defects in the monolayer graphene surface.

Abstract

Because graphene is carbon material and has excellent mechanical characteristics, its use as ultrathin lubrication protective films for machine elements is greatly expected. The durability of graphene strongly depends on the number of layers and the load scale. For use in ultrathin lubrication protective films for machine elements, it is also necessary to maintain low friction and high durability under macroscale loads in the atmosphere. In this study, we modified the surfaces of both monolayer and multilayer graphene by fluorine plasma treatment and examined the friction properties and durability of the fluorinated graphene under

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