

Fluoro-graphane: syntheses and possible applications

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In last decade, graphene and its derivatives get a lot of attention due to their properties such as ballistic transport, chemical stability, large surface area and fast heterogeneous electron transfer. However, the high chemical stability of conjugated π system is quite limiting in terms of graphene derivatization; thus, preparation well defined graphene modifications can be very challenging. On the other hand, polar C-X bonds can offer easier way to synthesized various modifications under mild conditions.[1,2,3] Such bonds can be found in hydrogenated (C-H) or fluorinated (C-F) graphene. Moreover, hydrogenated graphene (graphane) and fluorinated graphene (fluorographene) belong to the few graphene derivatives which can be prepared up to stoichiometry C_1X_1 . Therefore, they can be utilized as outstanding precursor for preparation of various graphene modifications, even those that cannot be prepared directly from graphene. Furthermore, band gap, fluorescence, magnetic and piezoelectric properties can be tuned by gradual addition of fluorine or hydrogen on the graphene skeleton.[3] Here, we want to present the syntheses of fluorinated graphane which can be prepared either by direct fluorination of hydrogenated graphene or by radical substitution of fluorine by hydrogen (see **Fig. 1**). For the radical substitutions, fluorographite can be used as a cheaper alternative to fluorographene, however, fluorographite achieved lower conversions rates. Both mentioned reactions can be used for

tailoring of hydrogen/fluorine content on graphene skeleton and thus for tuning of graphene properties. These materials possessed improved heterogeneous electron transfer rate, high capacity and superhydrophobicity. Moreover, it has been predicted by theoretical calculations that Janus like fluoro-graphane bilayers can exhibit electric field-induced gap opening.[4] Thus, such materials offer new design in optoelectronic devices.

Figures

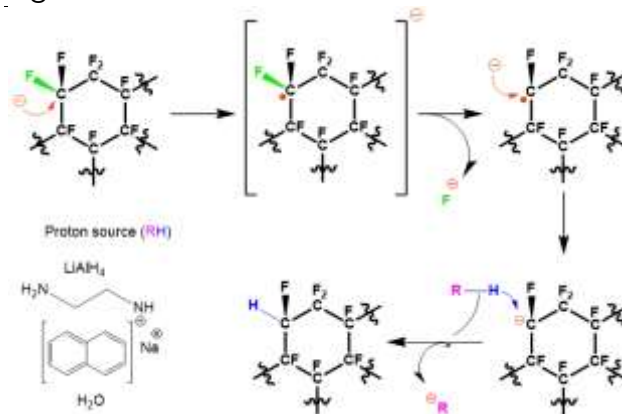


Figure 1: schematic illustration of fluorine radical substitution.

References

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