Enhancing the Synthesizing Efficiency of Graphene from the Expanded Version of Vein Graphite

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Abstract

Sri Lankan vein graphite comprises extraordinary purity, exceeding 99+% and occurs substantially as veins in colossal, underground sedimentary rocks. This carbon rich resource comes up with a unique potentiality to produce high quality graphene nevertheless, a number of obstacles are recognized to hamper the large scale production. Underground mining process at the boundary of the vein consistently brings about graphite lumps, consist of stone pieces hence, a substantial aggregate of graphite has been disposed off while hammering. In this study, it was intended to explore promising approaches to recover these graphite lumps and subsequently, to synthesize graphene from recovered graphite more efficiently. Lumps of graphite consist pieces of stones were treated with a dispersion of conc.H_2SO_4 and conc.HNO_3 in the way that 1:8 volume ratio in room temperature thus, the leaching of dispersion in to graphite layers facilitates the stripping off and obtains delaminated graphite together with stone pieces. Subsequently, the delaminated graphite was filtered and after several washing steps the sample is heated at 600^0C to acquire expanded graphite; the precursor for scalable synthesis of graphene. Hummers method with a few modifications enables a feasible production route concurrently, the expanded graphite enables the obvious penetration of the intercalating agent (conc. H_2SO_4) together with amenable oxidation. The spontaneous expansion of graphite influences in the way that, achieving the milestone of the study by acquiring yield of graphene about two times more than manipulating ball milled graphite as the precursor. The results give an insight into large scale, cost effective and industrially viable synthesis of graphene thus, pave the way towards massive production of enormously important graphene applications.