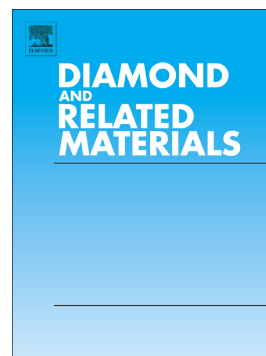


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Asma Rezaei, Ali Reza Kamali



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Green production of carbon nanomaterials in molten salts, mechanisms and applications

Asma Rezaei^{1,3}, Ali Reza Kamali*^{1,2}

1. Materials Chemistry and Chemical Metallurgy Group, School of Metallurgy, Northeastern University, Shenyang 110819, China
2. Department of Materials Science and Metallurgy, University of Cambridge, CB3 0FS, UK
3. School of Business Administration, Northeastern University, Shenyang 110004, China

Correspondence to: School of Metallurgy, Northeastern University, Shenyang 110819, China.

Fax: +86 24 23906316.

Email: ali@smm.neu.edu.cn

Abstract

Scalable green production of three dimensional graphene materials with high conductivity and thermal/chemical stability is a critical step toward overcoming the challenges facing the practical applications of graphene in a range of applications. Here, the electrochemical exfoliation of cathodically charged graphite materials in molten salts is discussed as an efficient approach for economic and environmentally sustainable production of high quality graphene related nanostructures in large scales with a number of interesting applications. The graphene nanosheets produced in molten salts exhibit a favorable combination of characteristics in terms of high crystallinity, thermal stability and electrical conductivity. Here, an overview is provided on the interaction between molten salts and carbonaceous materials with particular emphasis on cathodic exfoliation of graphite in molten LiCl and NaCl. The exfoliation mechanisms involved at various processing conditions, the products quality as well as other aspects including the associated economic and cost-benefit analysis are also discussed. The large scale green fabrication of inexpensive but high quality 3D graphene powder can lead to its wide application in various areas such as energy storage systems and composite materials with modified properties

Keywords: Graphene; Graphite; Molten salts; Lithium Chloride; Hydrogen; Exfoliation

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