

Successful synthesis of Iron Oxide-Graphene Oxide composites

Tapan Dash

Centurion University of Technology and Management, Odisha, India.

*Corresponding author: tapan.dash@cutm.ac.in; tapanphy@gmail.com

Abstract

In steel industry iron oxide has numerous applications. Dry planetary ball milling technique along with sintering is employed for successful synthesis of composites of graphene oxide and iron oxide. Graphene oxide (1.5 and 3 wt%) is added to iron oxide to prepare composites with improved mechanical properties. Iron oxide and graphene oxide composites were ball milled for 10 hrs followed by sintering. By X-ray diffraction (XRD) analysis infers peaks of iron oxide and graphene oxide (GO). Hardness of iron oxide and GO composite was found to be developed significantly when 3% of GO is added to it. The as prepared composites can be used on mild steel as coating material to enhance its mechanical and physical properties.

Keywords: Graphene oxide, Iron oxide, Hardness, Nano composite

1. Introduction

As the natural abundant resources iron oxide has been attracted greatly by researchers. Iron oxide found in three forms wustite (FeO), magnetite (Fe₃O₄), and hematite (Fe₂O₃) [1-4]. The development of any country is greatly influenced by the use and modernization of iron industry. It is involved with grate disadvantages because of involvement of corrosion and low surface hardness [5-10]. To overcome such disadvantages a suitable alloy or composite is expected to be developed. It is found that graphene oxide reinforced iron oxide composites “can develop efficient nano engineering components” with the attractive properties [11-12]. For “magnetic-assisted absorption and separation, platforms for electrochemical sensing and catalysis and as magnetic resonance”, etc. [13-17] “iron oxide-graphene oxide nano composites reported to be used. Tancredi, et al was reported to be prepared composite iron oxide and graphene via step-by-step process structure” [18]. “Graphene is one-atom-thick having 2D nanostructure having superior mechanical properties, thermal and physical properties” [19-24]. The honeycomb structure of GO/iron oxide composites is a unique material. Graphene oxide can control the microstructure, mechanical and physical properties of iron oxide. Iron oxide also can play important role in resisting restacking of graphene oxide layers. In this back drop, “it is more important to do research on iron oxide and