

Synthesis and Characterization of bulk Nano Crystalline Boron carbide through Mechanical Alloying Route

¹Dilkush

¹Assistant Professor

¹Department of Metallurgical & Materials Engineering

¹Rajiv Gandhi University of Knowledge Technologies (RGUKT), Nuzvid, India.

dilkush@rguktn.ac.in

**²P.Vijaya Kumar, ³T.Sasi kala, ⁴M.Revathi, ⁵G.Ramya
Sukeerthi, ⁶K.Naga Lakshmi, ⁷A.Vara Lakshmi, ⁸A.Vara
Lakshmi, ⁹B.Maheswari**

²Associate Professor, ^{3,4,5,6,7,8,9}B.Tech Students

²Department of Mechanical Engineering

²Raghu Institute of Technology, Visakhapatnam, India

^{3,4,5,6,7,8,9}Department of Metallurgical & Materials Engineering

^{3,4,5,6,7,8,9}Rajiv Gandhi University of Knowledge Technologies (RGUKT), Nuzvid, India

ABSTRACT

In this paper, investigations were carried out to develop the bulk nano crystalline boron carbide with enhanced strength and reduced melting temperatures. The produced nano boron carbide powder can be able to utilize as filler material for performing different welding operations. The most effective method of mechanical alloying route through ball milling operation was adopted in our present work. For this study, the initial size of boron carbide powder with 30 micrometers was chosen. The high energy ball milling technique was carried out to perform the synthesis of bulk nano crystalline boron carbide powder from 30 micrometers to 40 nanometers. The series of millings were carried out for a period of 20 hrs. The milled boron carbide samples are collected at regular intervals with respect to different milling times. The reduction of crystalline size of the boron carbide powder was characterized by using X-Ray diffraction (XRD) analysis. The Structural analysis and surface morphology of the milled powders were characterized by using Scanning electron microscopy (SEM). The present work investigation results showed that for a milling time of 20 hours, the crystalline size was reduced from 30 micrometers to 40 nanometers respectively justified with the obtained results from XRD and SEM analysis.

Keywords: Boron carbide, Nano crystalline powders.