

High Temperature Processing and Sintering

Powder Syntheses of Advanced Ceramics Using Novel Approach – DCR Process

İleri Teknoloji Seramik Toz Üretimi İçin Yeni Bir Yaklaşım - DKTİ Prosesi

Ali Osman KURT

Sakarya University, Research-Development and Application Centre (SARGEM), 54187, Sakarya, Turkey.

Advanced ceramics are critical material in many industries, such as health, electronics, military, high temperature and many other area of applications. They are in general costly products due to the nature of their production methods that initially rely on high quality synthetic powders. Good quality powders, i.e., high purity, very fine and uniax grains are very expensive and could be obtained with complicated and costly processes. Therefore, it is important developing new and competitive powder production techniques to enabling easy access to cheap ceramic powder raw material supply. In this concept, recently the dynamic / carbothermal reduction (DCR) process was developed and successfully applied in synthesizing some advanced ceramics powder, namely silicon nitride (both α or β form of Si_3N_4), aluminium nitride (AlN), boron nitride (BN), boron carbide (B_4C), titanium nitride (TiN), zirconium nitride (ZrN) and titanium diboride (TiB_2). DCR is the high temperature process taken place between 1300 – 1500 °C under controlled atmosphere in rotary furnace. Although DCR technique was successful in synthesizing such important advanced ceramic powders in required quality, it was only applied in laboratory scale (i.e. on the order of a few grams per day). Further work for prototype scale (a few kilograms per day) synthesis of such powders are planned before moving to the industrial scale (a few hundred or tons per day) production.

E-mail address: aokurt@sakarya.edu.tr