

## Determination of Sintering Parameters of $TiB_2 - Ti_3SiC_2$ Composites

**Authors :** Bilge Yaman Islak, Erhan Ayas

**Abstract :** The densification behavior of  $TiB_2 - Ti_3SiC_2$  composites is investigated for temperatures in the range of 1200°C to 1400°C, for the pressure of 40 and 50MPa, and for holding time between 15-30 min by spark plasma sintering (SPS) technique. Ti, Si, TiC and 5 wt.%  $TiB_2$  were used to synthesize  $TiB_2 - Ti_3SiC_2$  composites and the effect of different sintering parameters on the densification and phase evolution of these composites were investigated. The bulk densities were determined by using the Archimedes method. The polished and fractured surfaces of the samples were examined using a scanning electron microscope equipped with an energy dispersive spectroscopy (EDS). The phase analyses were accomplished by using the X-Ray diffractometer. Sintering temperature and holding time are found to play a dominant role in the phase development of composites.  $Ti_3C_2$  and  $TiSi_2$  secondary phases were found in 5 wt.%  $TiB_2 - Ti_3SiC_2$  composites densified at 1200°C and 1400°C under the pressure of 40 MPa, due to decomposition of  $Ti_3SiC_2$ . The results indicated that 5 wt.%  $TiB_2 - Ti_3SiC_2$  composites were densified into the dense parts with a relative density of 98.77% by sintering at 1300 °C, for 15 min, under a pressure of 50 MPa via SPS without the formation of any other ancillary phase. This work was funded and supported by Scientific Research Projects Commission of Eskisehir Osmangazi University with the Project Number 201915C103 (2019-2517).

**Keywords :** densification, phase evolution, sintering,  $TiB_2 - Ti_3SiC_2$  composites

**Conference Title :** ICCMSN 2020 : International Conference on Chemistry, Materials Science and Nanoscience

**Conference Location :** Bangkok, Thailand

**Conference Dates :** February 03-04, 2020