*Proceedings of the World Congress on Mechanical, Chemical, and Material Engineering (MCM 2015)*
*Barcelona, Spain – July 20 - 21, 2015*
*Paper No. 341*

# Improvement of Open Porosity as a Function of Compacting Pressure in Bulk Graphite Manufacture by using Isotropic Graphite Powder

**Sang Min Lee, Dong Su Kang, Jae Seung Roh**
School of Materials and Systems Engineering, Kumoh National Institute of Technology,
Gumi, Gyeongbuk 730-701, Korea
dark2088@kumoh.ac.kr; dsk@kumoh.ac.kr; jsroh@kumoh.ac.kr

## Extended Abstract

The manufacture process of synthetic graphite generally consists of crushing coke to an appropriate grain size and mixing it with binding materials, followed by mulling, forming, and carbonization. However, volatile substances in the binding materials are released during the carbonization process, thereby creating a number of pores within the bulk graphite that eventually compromise physical performance. In order to eliminate such defects, the process of impregnation and carbonization is repeated to fill the pores. The ratio of the volume of open pores to the total volume of all pores must be high in order to improve the impregnation effect.

In contrast with open pores connected exterior surfaces, Pores nested inside the artificial graphite usually are defined as closed pores from the exterior surface [1]. In impregnation process to increase the impregnation efficiency impregnation step, it is possible to increase efficiency if many pores opened in the whole pores. Because it increases the contact area of the impregnating agent as the formation of channels between the open pores is good [2].

This study examined the changes in open porosity as a function of compacting pressure in bulk graphite manufactured by using isotropic graphite powder. The raw powder and binder were mixed with a weight ratio of 8:2, and uniaxial pressing was carried out at 30MPa and 120MPa to produce a green body. The green body was then carbonized at 700℃ to make bulk graphite. For the porosity analysis, the Archimedes method (ISO 18754:2003) was employed to measure the changes before and after impregnation. The results showed that bulk graphite pressed at 30Mpa had a density of 1.277g/cm3, while the 120MPa pressed graphite had a density of 1.287g/cm3. The open porosity of the 30Mpa version was 25.35%, while the 120Mpa version was 28.34%, with open porosity rising along with pressure. As the pressing pressure increases, the packing density of the mixed powder increases, resulting in higher density, whereas open porosity increases as a result of interfacial air forming passages to the exterior of the green body during the densification process under high pressure formation [3].

***Keyword:*** bulk graphite, isotropic graphite powder, open porosity

Lim, S. Y., Jung, D. W., Yoon, S. H., & Mochida, I. (2008). Carbon Materials as Catalysts. *Carbon Letters*, *9*(1), 47-60.

Han, Y. S., Kim, H. J., Shin, Y. S., Park J. K., & Ko, J. C. (2009). Journal of the Korean Ceramic Society. *1*(46), 16-23.

Lee, W. J. (1987). The Korean Institute of Metals and Materials. *1*, 55-75.