§74. Resistivities of Metal Powder Loaded Graphite for Oxidation in Air at High Temperatures-II

Nakayama, Y. (Fac. Eng., Ehime Univ.)
Motojima O., Tawara, H.

In order to investigate the resistivities of graphite for oxidation , we measured the weight loss of 6 different types of graphite (isotropic graphite 1: IG-1T, isotropic graphite 2: IG-2R, highly graphitized isotropic graphite: IG-3Q, electrical high resistivity isotropic graphite: IG-4U, high density graphite : IG-5S, ultra high density isotropic graphite: IG-6P) at 450, 550 and 650 ℃ for 3 hours each exposed in air. Also we studied chemical resistivities for 6 chemical reagent grade metal powders of V, Fe, Co, Cu, Zn, Sn, W, and Pb. The test pieces were checked for appearance, weight change, size, density, and SEM picture before and after being heated.

The test pieces cut from a single lot block had the size of 20mm×10mm×60 mm with a hole of 15 mm in diameter×5 mm in depth for mounting metal powder.

The measured weight losses of pure graphite are found to be 0.3 % or less for all the pieces tested after being heated at 450 ℃, 0.6% or less at 550 ℃, except for IG-5S (1.0%) and IG-6P (1.5%), and 10 % or more at 650 ℃, except for IG-1T (2.7%), IG-2R (6.0 %) and IG-3Q (7.2 %).

The typical weight losses of graphite with metal powder are summarized in Fig. 1 which shows three types of weight loss behavior: 1) (IG-1T) shows small weight loss, except for that with Pb at high temperatures, 2) (IG-2R, IG-3Q, and IG-4U) , the reduced weight loss even at high temperatures and 3) (IG-5S and IG-6P) complex patterns of weight loss both with and without metal powder at high temperatures, including those with Pb.

The present results of the weight loss measurements of various graphites can be summarized as follows:

1) High purity isotropic graphite has strong resistivity for oxidation in air.

2)The same type graphite materials but different kinds of raw materials prepared with different procedures induce differences of resistivity for oxidation in air.

3) Apparent weight loss does not show clear relationship between metal powders and graphite materials.

4) Pure graphite without metal powder with 10% or more weight loss at 650 ℃ , show complex resistivity for metal powders. Thorough evaluation including other characteristics is necessary.

The present results suggest that graphite, whose resistivities are strongly dependent upon the original production procedures and the mixed metal powders, should be carefully selected, depending on how they will be used.

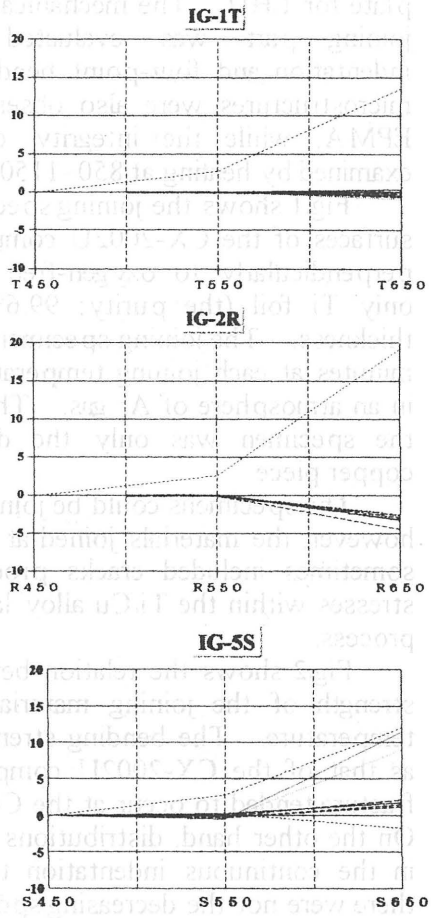

Fig. 1. Weight loss of graphites heated at 450, 550 and 650 ℃ in air for 3 hours with various metal powders.

References

1)Nakayama, Y., Murata, Y., Hirano, H., and Hosokawa, K., - 23rd Biennial Conf. on Carbon, State College, PA, USA, 7/1997, pp.412-413.

2)Nakayama, Y., Kitamura, T., Hirano, H.,and Hosokawa, K., Carbon '96, Newcastle Upon Tyne, United Kingdom, 7/1996, pp.511-512.

3)Nakayama, Y., Fujita, K., Kumamoto, K., Okamoto, E., Hirano, H., and Hosokawa, K., 22nd Biennial Conf. on Carbon, San Diego, USA,7/1995,pp.190-191.