The properties and analysis of the distribution and characterization of the states in diamond thin film bandgap

陳正哲、李世鴻

E-mail: 8804778@mail.dyu.edu.tw

ABSTRACT

Diamond have a lot of prominent properties, including electronic characteristics. Therefore, the application of diamond thin film electronic devices in high power, high frequency and high temperature have larger potentiality in the future. For more effective using the excellent properties of diamond, it is necessary to understand their transport mechanism and bandgap states distribution. In view of this, the major tasks discussed in this research are the electronic characterization measurements in temperature and the analysis of the resultant of the current transportation. Further we can realize the carriers transport mechanism and their states distribution in diamond thin film as newer research and fabrication as reference. Keywords: diamond thin film, transport mechanism, states distribution

Keywords : diamond thin film ; transport mechanism ; states distribution

Table of Contents

REFERENCES

參考文獻 [1] J. E. Field(ed.), "The properties of natural and synthetic diamond", Academic Press, 1992.

[2] K. E. Spear and John P. Dismukes, "Synthetic diamond emerging CVD science and technology", John Wiley, 1994.

[3] A. Johnson, RCA Review, vol. 26, pp. 163, 1963.

[4] R. W. Keys, Proceeding of IEEE, vol. 60, pp. 225, 1972.

[5] K. Okano, H. Kiyota, T. Iwasaki, and T. Kurosu, "Synthesis of n-type semiconductive diamond film and fabrication of a PN junction diode", New diamond Science and Technology, pp.919-912, 1991.

[6] B. V. Deryagin and D. V. Fedoseev, "Growth of diamond and graphite from the gas phase", Nauka, Moscow, 1977.

[7] C. F. Chen, C. L. Lin, and T. M. Hong, Surface & coatings Technology, vol. 52, pp. 205, 1995.

[8] S. A. Grot, Gennady Sh. Gildenblat, C. W. Hatfield, C. R. Wronski, A. R. Badzian, T. Badzian, and R. Messier, "The effect of surface treatment on the electrical properties of metal contacts to boron-doped homoepitaxial diamond film", IEEE Electron Devices Letters, vol. 11, No. 2, pp. 100-102, 1990.

[9] G. Sh. Gildenblat, S. A. Grot, C. W. Hatfield, A. R. Badzian, T. Badzian, and R. Messier, "Electrical properties of homoepitaxial diamond films", MRS Symposium Proceedings, vol. 162, pp.297-302, 1990.

[10] A. B. Harker, J. F. DeNatale, and J. F. Flintoff, "Direct observation of the defect structure of polycrystalline diamond by scanning electron microscopy", Appl. Phys. Lett. vol. 62, pp. 3105-3107, 1993.

[11] 李世鴻，「積體電路製程技術」，五南圖書出版公司，民國87年10月。

[12] A. Lettington, and J. W. Steeds, Eds. "Thin film diamond", Chapman & Hill, 1975.

[13] E. O. Hohnson, "Physical limitations of frequency and power parameters of transistors", RCA Review, pp. 163-177, 1965.

[14] 李世鴻，「半導體工程原理」，全威圖書出版公司，民國86年9月。

[15] D. M. Malta, J. A. von Windheim, H. A. Wynands, and B. A. Fox, "Comparison of the electrical properties of simultaneously deposited homoepitaxial and polycrystalline diamond films", J. Appl. Phys. vol. 77(4), pp. 1536-1545, 1995.

[16] B. A. Fox, M. L. Hartsell, D. M. Malta, H. A. Wynands, G. J. Tessmer, and D. L. Dreifus, "Electrical properties of diamond for device applications", Mat. Res. Soc. Symp. Proc., vol. 416, pp.319-330, 1996.
[17] Sir Nevill Mott, "Conduction in non-crystalline materials", Oxford University Press, 1967.
[18] C. A. Wolden, S. K. Han, M. T. McClure, Z. Sitar, and J. T. Prater, "Highly oriented diamond deposited using a low pressure flat flame", Material Letters, vol. 32, pp. 9-12, 1997.
[19] K. Shenai, R. S. Scott, and B. J. Baliga, "Optimum semiconductors for high-power electronics", IEEE Transactions on Electronic Devices, vol. 36, No. 9, 1989.
[20] A. Rose (ed.), "Concept in photoconductivity and allied problems", John Wiley &Sons, 1963.