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## Temperature-dependent Structural and Magnetic Properties of Diamagnetic $HgI_2$

**C.-I. Park[1], Zhenlan Jin[1], I.-H. Hwang[1], S.-M. Yeo[2], S.-W. Han[1]***

[1]Department of Physics Education and Institute of Fusion Science, Chonbuk National University, Jeonju 561-756, [2]KAERI (Korea Atomic Energy Research Institute), P. O. Box 105, Yuseong, Daejeon 305-600, Korea

We examined the temperature-dependent structural and magnetic properties of HgI2 in the temperature range of 300～400 K. HgI2 is a diamagnetic material and can be used for X-ray or $\gamma$-ray detectors. DC-magnetization measurements on HgI2 showed that there is a small but distinguishable change in its diamagnetic properties near 375 K. The magnetic property change is not expected because Hg and I are known as nonmagnetic elements. X-ray diffraction (XRD) measurements revealed a structural transition in the temperature of 350～400 K. Temperature-dependent x-ray absorption fine structure (XAFS) demonstrated that the chemical valence states of both Hg and I did not changed in the temperature range of 300～400 K. However, XAFS revealed that the bond-length disorder was slightly increased in the temperature range, particularly, near Hg atoms. The structural changes of HgI2 are likely related to its diamagnetic property change. We will discuss the relation between the diamagnetic properties and local structural properties of HgI2 in detail.

**Keywords:** $HgI_2$ Structural Magnetic Properties

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## Self-catalytic Growth of $\beta$-Ga2O3 Nanowires Deposited by Radio-Frequency Magnetron Sputtering

**최광현, 강현철**

조선대학교 신소재공학과

Growth behavior of b-Ga2O3 nanowires (NWs) on sapphire(0001) substrates during radio-frequency magnetron sputtering is reported. Upon fabrication, flat thin films grew initially, subsequent to which, NW bundles were formed on the surface of thin film with increasing film thickness. This transition of the growth mode occurred only at temperatures greater than ～450°C. The b-Ga2O3 NWs were grown through the self-catalytic vapor-liquid-solid mechanism with self-assembled Ga seeds. Secondary growth of NWs, which occurred from the sides of primary NWs resulting in branched NW structures, was also observed. Finally, the room temperature photoluminescence properties of as-grown and annealed b-Ga2O3 NW samples were investigated.

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**Keywords:** Ga2O3, Nanowire, Self-catalytic VLS