A-1

스퍼터링 방법으로 성장시킨 나노구조의 Ga 농도 변화에 따른 형상 변화

김영이, 우창호, 조형균†

성균관대학교 신소재공학과

(chohk@skku.edu†)

ZnO is of great interest for various technologicalapplications ranging from optoelectronics to chemical sensors because of itssuperior emission, electronic, and chemical properties. In addition, verticallywell-aligned ZnO nanorods on large areas with good optical and structuralproperties are of special interest for the fabrication of electronic andoptical nanodevices. To date, several approaches have been proposed for thegrowth of one-dimensional (1D) ZnO nanostructunres. Several groups havebeen reported the MOCVD growth of ZnO nanorods with no metal catalysts at 400 °C, and fabricated a well-aligned ZnOnanorod array on a PLD prepared ZnO film by using a catalyst-free method. Ithas been suggested that the synthesis of ZnO nanowires using a template-less/surfactant-freeaqueous method.

However, despite being a well-establishedand cost-effective method of thin film deposition, the use of magnetronsputtering to grow ZnO nanorods has not been reported yet. Additionally,magnetron sputtering has the advantage of producing highly oriented ZnO filmsat a relatively low process temperature.

Currently, more effort has beenconcentrated on the synthesis of 1D ZnO nanostructures doped with various metalelements (Al, In, Ga, etc.) to obtain nanostructures with high quality,improved emission properties, and high conductance in functional oxide

semiconductors. Among thesedopants, Ga-doped ZnO has demonstrated substantial advantages over Al-dopedZnO, including greater resistant to oxidation. Since the covalent bond lengthof Ga-O (1.92 Å) is nearly equal to that of Zn-O (1.97 Å), high electronmobility and low electrical resistivity are also expected in the Ga-dopedZnO. In this article, we report the successful growth of Ga-dopedZnO nanorods on c-Sapphire substrate without metal catalysts by magnetronsputtering and our investigations of their structural, optical, and fieldemission properties.

Keywords: Ga, Sputtering, nanorod

A-2

HIGH-THROUGHPUT PROCESS FOR ATOMIC LAYER DEPOSITION

Woong-Chul Shin, Kyu-Jeong Choi†, Min Baek, Miry Kim

NCD Technology

(rulechoi@ncdtech.co.kr†)

Atomic layer deposition (ALD)have been proven to be a very attractive technique for the fabrication ofadvanced gate dielectrics and DRAM insulators due to excellent conformality andprecise control of film thickness and composition, However, one majordisadvantages of ALD is its relatively low deposition rate (throughput) becausethe deposition rate is typically limited by the time required for purgingprocess between the introduction of precursors. In order to improve itsthroughput, many efforts have been made by commercial companies, for example,the modification reactor and development of precursors. However, any promisingsolution has not reported to date.

We developed a new concept ALD system(LucidaTM S200) with high-throughput. In this process, a continuous flow of ALDprecursor and purging gas are simultaneously introduced from differentlocations in the ALD reactor. A cyclic ALD process is carried out by moving thewafer holder up and down. Therefore, the time required for ALD reaction cycleis determined by speed of the wafer holder and vapor pressure of precursors.

We will present the operating principle ofour system and results of deposition.

Keywords: atomic layer deposition,high throughput