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ELECTROCERAMICS-Ⅲ

C-THU-14

MULTILAYERED TANTALUM-ALUMINIUM OXIDE FILMS GROWN BY ATOMIC LAYER DEPOSITION, YONG S. KIM, J. S. KANG, S. J. YUN, M.-C. PAEK and K.-S. NAM (Semiconductor Technology Division, Electronics and Telecommunications Research Institute, Taejon, 305-350, Korea)

The dielectric films with a total thickness of 50 nm, being composed of thin layers of tantalum oxide and aluminum oxide, have been grown using the large-area atomic layer deposition at the temperature of 310 °C from metallic chlorides and H_2O. Their average compositions and layered structures have been varied in a controllable way by altering the pulse sequence of the deposition process. Each thickness of the two alternating oxides ranges from ten to sub-nanometer. Electrical and optical properties, such as breakdown electric field, leakage current, relative dielectric constant, and refractive index, are characterized for evaluating the multilayered films. Post-annealing effects are also investigated for examining the crystallization of tantalum oxide which provides the pathways for leakage current and easily leads to electric breakdown of insulators. Even very thin layers of aluminum oxide inserted into the tantalum oxide results in a significant improvement in the electric breakdown properties. These results are discussed in terms of the application to the fabrication of the electroluminescent (EL) devices.

C-THU-15

A NEW CLASS OF SINGLE SOURCES FOR THE CHEMICAL VAPOR DEPOSITION OF HETERO-METALLIC OXIDES, W. KOH, S.-J. KU, C.-G. KIM, K.-S. YU, and Y. KIM (Advanced Materials Division, Korea Research Institute of Chemical Technology, Taejon 305-343, Korea)

A new class of single sources for the chemical vapor deposition of heterometallic oxides of the form MM'_2O_4 and $MM'O_2$ has been developed. These sources are alkyl alkoxides of two different metals having the formulas $M[(\mu\text{-}OR')_2M'R_2]_2$ and $M''[(\mu\text{-}OR')_2M'R_2]$.

Typical heterometallic compounds that can be deposited using these sources are $MgAl_2O_4$, $BeAl_2O_4$, $ZnGa_2O_4$, $LiAlO_2$, and $LiGaO_2$. Thin films of these compounds may find applications in fabrication of humidity sensors, substrates for perovskites, low-voltage phosphors, and substrates for gallium nitride compound semiconductor films. In this research, emphasis has been placed on the development of these sources and confirmation of the films formed by employing them in chemical vapor deposition. A possible CVD mechanism is proposed based on their decomposition products.

C-THU-16

FREQUENCY AND TEMPERATURE DEPENDENT ELECTRICAL CHARACTERISATION OF Al/OXIDE/GaSb MOS STRUCTURE

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Abstract

In this study device quality native oxide was grown on n and p-type GaSb (111) by wet thermal oxidation at an optimum temperature of 400°C and gas flow rate of 18 l/hr. The amorphous state of the oxide film was confirmed using XRD. The oxide had high DC resistance ($\sim 10^{10}\Omega$-cm) and break down field strength of $\sim 10^6$ Vcm^{-1}. Frequency dependent and temperature dependent capacitance vs voltage measurements were carried out on Al/oxide/GaSb MOS diodes. The interface state density (Dit) as calculated by Termans method, varied from $2.46(\pm 0.2)\times 10^{12}$ to $3.3(\pm 0.2)\times 10^{12}$ eV^{-1} cm^{-2} for p-type MOS diodes in the frequency range 100Hz to 1MHz. The oxide charge was found to be order~10^{11} cm^{-2} for both types of MOS diodes in the same frequency range. As the temperature of Al/oxide/GaSb MOS diode was varied from 36°C to 150°C, the Dit values increased from $3.6(\pm 0.2)\times 10^{12}$ to $1.66(\pm 0.2)\times 10^{13}$ eV^{-1} cm^{-2} for n and p-type substrates.

C-THU-17

EXTRACTION OF THERMAL PARAMETERS FOR A THERMAL MICROACTUATOR, JAE-YOUL LEE and SANG-WON KANG (Dept. of Mat. Sci. & Eng. KAIST, Taejon, 305-701, Korea)

Extraction of thermal parameters for a thermal microactuator is useful to design the operation speed and power consumption. This work includes the measurement of the thermal conductance and the thermal capacitance for the thermal microactuator. These parameters have been derived from the equivalent electrical circuit model of the thermal microactuator and electrical impedance measurement results. Electrical impedance of the thermal microactuator is measured under various conditions by changing dc voltage, ac voltage, pressure and frequency. The method based on an electrical impedance analysis don't need any radiation source and dc method. And extracted parameters are insensitive to the ambient temperature variation.

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