분과	포스터세션 LIVE CHAT 일정
A. Interconnect & Package	29일(금), 9:00-11:00
B. Patterning	27일(수), 9:00-11:00
C. Material Growth & Characterization	28일(목), 16:00-18:00
D. Thin Film Process Technology	28일(목), 9:00-11:00
E. Compound Semiconductors	27일(수), 16:00-18:00
F. Silicon and Group-IV Devices and Integration Technology	28일(목), 9:00-11:00
G. Device & Process Modeling, Simulation and Reliability	27일(수), 16:00-18:00
H. Display and Imaging Technologies	29일(금), 16:00-18:00
I. MEMS & Sensor Systems	28일(목), 9:00-11:00
J. Nano-Science & Technology	26일(화), 9:00-11:00
K. Memory (Design & Process Technology)	29일(금), 9:00-11:00
L. Analog Design	27일(수), 9:00-11:00
M. RF and Wireless Design	29일(금), 10:30-11:30
N. VLSI CAD	26일(화), 9:00-11:00
O. System LSI Design	26일(화), 9:00-11:00
P. Device for Energy (Solar Cell, Power Device, Battery, etc.)	28일(목), 16:00-18:00
Q. Metrology, Inspection, Analysis, and Yield Enhancement	28일(목), 16:00-18:00
R. Semiconductor Software	29일(금), 9:00-11:00
S. Chip Design Contest	26일(화), 9:00-11:00

D. Thin Film Process Technology 분과

2021년 1월 25일(월), 10:45-12:15 / Room A

▶ [MA2-D] Ferroelectric Films Ⅱ

MA2-D-1 **10:45-11:00**	**Pulsed I-V Method for Characterizations on Genuine Ferroelectric FieldEffects of the MFMIS-FETs Using Hf-Zr-O Gate Insulators** Tae-Hyun Ryu, Dae-Hong Min, and Sung-Min Yoon *Department of Advanced Materials Engineering for Information and Electronics, Kyung Hee University*
MA2-D-2 **11:00-11:15**	**The Effect of Bottom Electrodes on Ferroelectricity of ALD-$Hf_{0.5}Zr_{0.5}O_2$ Films** Namhun Kim[1,2], Jaidah Mohan[1], Yong Chan Jung[1], Heber Hernandez-Arriaga[1], Kihyun Kim[1,2], Hye-Won Kim[2], Si Joon Kim[3], Rino Choi[2], and Jiyoung Kim[1] *[1]Department of Materials Science and Engineering, The University of Texas at Dallas, [2]Department of Material Science and Engineering, Inha University, [3]Department of Electrical and Electronics Engineering, Kangwon National University*
MA2-D-3 **11:15-11:30**	**Defect Engineering을 통한 TiN/$H_{0.5}Z_{0.5}O_2$/TiN 커패시터의 Wake-up Effect와 강유전성 개선** Hyungwoo Kim[1,2], Alireza Kashir[1,2], Seungyeol Oh[1,2], and Hyunsang Hwang[1,2] *[1]Center for Single Atom-based Semiconductor Device, POSTECH, [2]Department of Materials Science and Engineering, POSTECH*
MA2-D-4 **11:30-11:45**	**Seed Layer Effect of HZO Nanolaminate Structure on Tungsten Electrode** Seung-Min Han[1,2], Dae-Hwan Ahn[1], Woo-Young Choi[2], and Jae-Hoon Han[1] *[1]Center for Opto-Electronic Materials and Devices, KIST, [2]Department of Electrical and Electronic Engineering, Yonsei University*
MA2-D-5 **11:45-12:00**	**Laser Drilling Via Process for 3-D Flexible Integrated Circuits** Suwon Seong, Seongmin Park, Jueun Kim, and Yoonyoung Chung *Department of Electrical Engineering, POSTECH*
MA2-D-6 **12:00-12:15**	**Study of Ferroelectric Characteristics of $Hf_{0.5}Zr_{0.5}O_2$ Thin Films Grown on Sputtered or Atomic-layer Deposited TiN Bottom Electrodes** Beom Yong Kim[1,2,3], Hyeon Woo Park[1,2], Seung Dam Hyun[1,2], Yong Bin Lee[1,2], Suk Hyun Lee[1,2], Minsik Oh[1,2], Seung Kyu Ryu[1,2], In Soo Lee[1,2], Seung Yong Byun[1,2], Soo Jin Jo[1,2], Do Sup Shim[1,2], and Cheol Seong Hwang[1,2] *[1]Department of Materials Science and Engineering, Seoul National University, [2]Inter-University*

Seed Layer Effect of HZO Nanolaminate Structure on Tungsten Electrode

Seung-Min Han[1, 2], Dae-Hwan Ahn[1], Woo-Young Choi[2*], Jae-Hoon Han[1**]
[1] *Center for Opto-Electronic Materials and Devices, KIST*
[2] *Department of Electrical and Electronic Engineering, Yonsei University, Korea*
E-mail: *wchoi@yonsei.ac.kr, **hanjh@kist.re.kr

$Hf_xZr_{1-x}O_2$-based ferroelectric materials have received much attention since 2011 due to its good compatibility with CMOS technology [1]. Large remnant polarization (P_r) is one of the most important factors to improve ferroelectric device performance such as FeRAM, FeFET. There are several reports that nanolaminate structure consisted of HfO_2 and ZrO_2 can make higher P_r value than HZO solid solution [2, 3]. In this report, we investigated the dependence of a seed layer to improve the performance of an MFM capacitor composed of a HZO nanolaminate structure and tungsten (W) electrodes. To make MFM capacitors, at first, the W bottom electrode is deposited on n+ Si substrate by sputtering. To confirm the effect of seed layers, 1-nm HfO_2 or ZrO_2 seed layer is deposited on the W bottom electrode as shown in Fig. 1(a). Then, HfO_2 and ZrO_2 were alternately deposited by 1 nm thickness respectively using ALD (Atomic Layer Deposition) and the total thickness of the HZO layer is 11 nm. Finally, the W top electrode was stacked on the HZO layer. To confirm the *P*-*E* characteristics of MFM capacitors, *P*-*E* curves were measured after annealing process using RTA (Rapid Thermal Annealing) (Fig. 1(b)). The ZrO_2 seed layer has a greater P_r value than the HfO_2 seed layer at all RTA temperatures (Fig. 1(c)). This HZO nanolaminate structure with ZrO_2 seed on W electrode is promising solution to achieve high P_r for future ferroelectric devices.

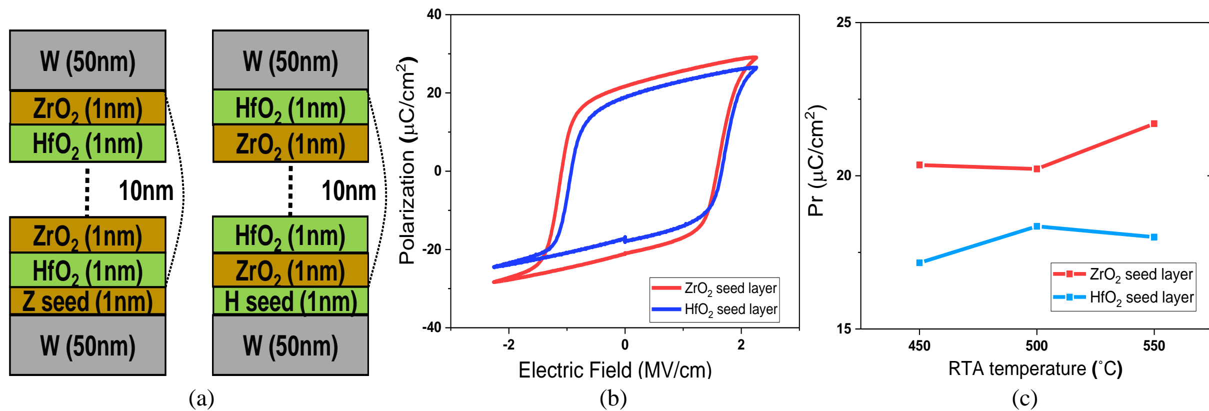

Fig. 1. (a) Structures of MFM capacitors, (b) *P*–*E* curves with ZrO_2 or HfO_2 seed layer, (c) P_r with ZrO_2 or HfO_2 seed layer

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References [1] M. H. Park *et al.*, *MRS Communication*, **8** 795 (2018). [2] M. H. Park *et al.*, *Appl. Phys. Rev.*, **6** 041403 (2019). [3] Stephen L. Weeks *et al.*, *ACS Appl. Mater. Interfaces*, **9** 13440 (2017).