Supporting information for

Effects of Deposition Temperature on the Device Characteristics of Oxide Thin-Film Transistors Using In-Ga-Zn-O Active Channels Prepared by Atomic-Layer Deposition

Sung-Min Yoon[1], Nak-Jin Seong[2], Kyujeong Choi[2], Gi-Ho Seo[1], and Woong-Chul Shin[2]*

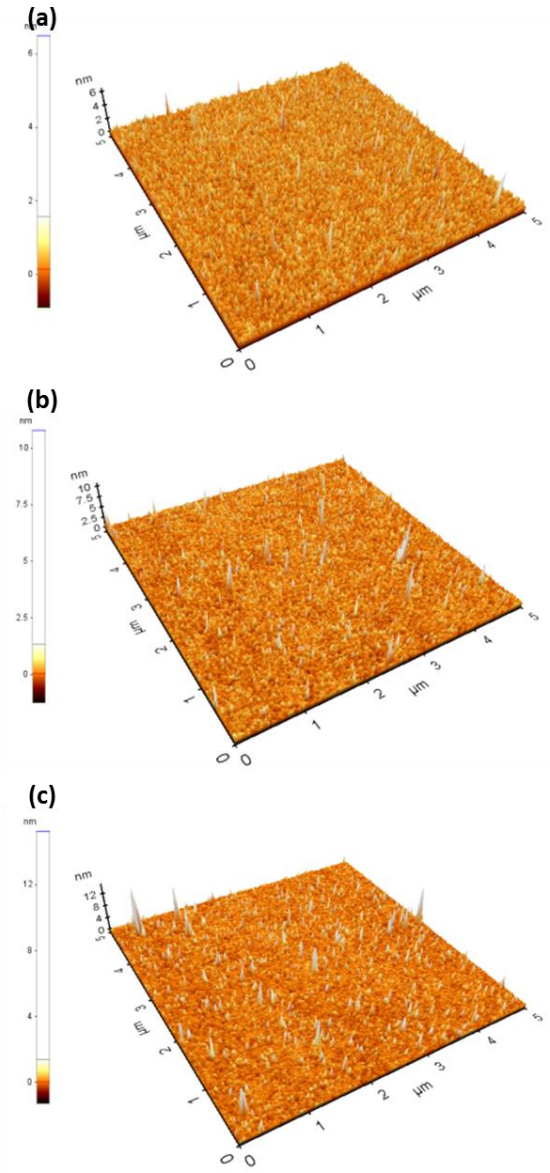
[1] Department of Advanced Materials Engineering for Information and Electronics, Kyung Hee University, Yongin, Gyeonggi-do 17104, Korea

[2] NCD Co. Ltd., Daejeon 34015, Korea

*E-mail: sungmin@khu.ac.kr

1. Surface morphologies of the ALD-IGZO films

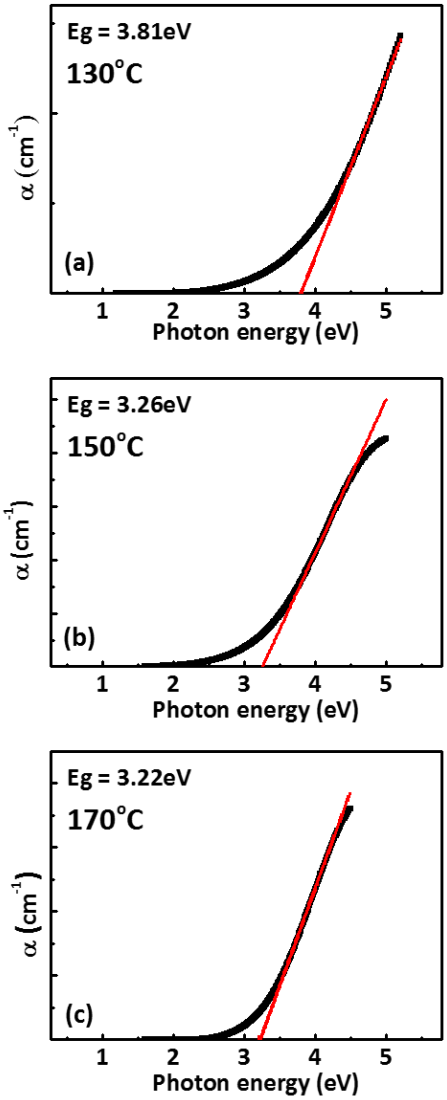
Figure S1.



This supporting information exhibits the atomic force microscope (AFM) images of the IGZO films deposited at different ALD temperatures of 130, 150, and 170 ^{o}C in a 5×5 µm scan area. The root-mean square surface roughness (R_q) of the IGZO films showed an increasing trend as the ALD temperatures increased, in which the R_q values were estimated to be approximately 0.30, 0.34, and 0.46 nm for the IGZO films deposited at 130, 150, and 170 ^{o}C, respectively, as shown in Figure S1.

2. Optical band gaps of the ALD-IGZO films

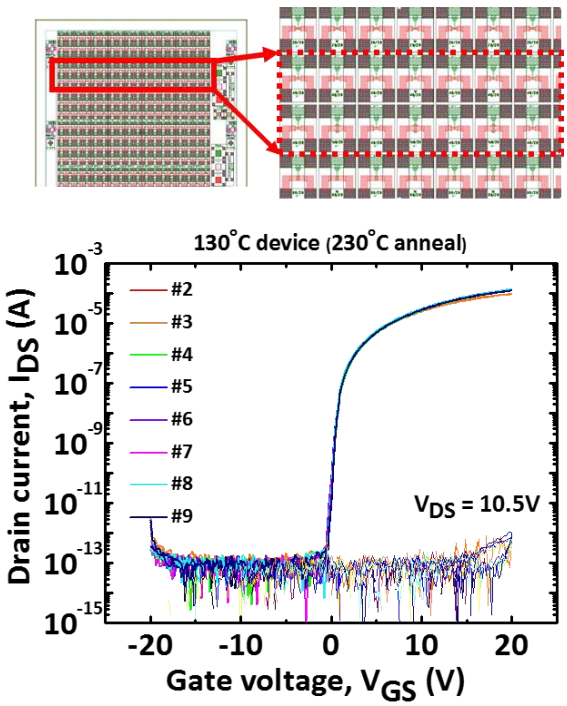
Figure S2.



This supporting information shows the curve fittings of the absorption coefficient as a function of the photon energy measured by spectroscopic ellipsometer (SE J. A. Woolam Co.) analyzer. The calculated optical band gaps of the IGZO films appeared to be 3.81, 3.26, and 3.21 eV when the ALD temperatures were controlled to be 130, 150, and 170 ^{o}C, respectively, as shown in Figure S2.

3. Device-to-device uniformity

Figure S3.



This supporting information shows typical examples of device-to-device uniformity in transfer characteristics of the TFTs using the IGZO channel deposited at 130 °C and annealed at 230 °C, as shown in Figure S3. The number of evaluated devices were 9 in this case.