Structure Engineering of LTPS Device

Date: Aug. 30, 2017 (Wednesday)
Time: 16:00~17:15
Session Chairs: Prof. Shin-Ichiro Kuroki (Hiroshima Univ., Japan)
               Prof. James S. Im (Columbia Univ., U.S.A)

C43-1 16:00~16:25

Invited Four-Terminal LTPS TFTs on a Glass Substrate

Akito Hara and Hiroki Ohsawa (Tohoku Gakuin Univ., Japan)

We have evaluated the performance of the 4T CLC LT poly-Si TFTs and they exhibited excellent controllability of Vth, small subthreshold swing (s.s.), and high electron field-effect mobility. Using the high controllability of Vth of the n-channel and p-channel 4T CLC LT poly-Si TFTs, the operation of CMOS inverter under Vdd=1.0 V was succeeded.

C43-2 16:25~16:50

Invited Challenges for Application of LTPS TFT in Flexible AMOLED Display

Shixing Cai, Kun Hu, Li Lin, Xiaoyu Gao, and Xiuqi Huang (Visionox, China)

Active-Matrix Organic Light-Emitting Diode (AMOLED) has been widely used in flat panel displays due to its excellent performance, such as wide viewing angle, light weight and vivid color. And the flexible display has become the most anticipated application for AMOLED. Besides its ultra-thin and light, it is extraordinarily flexible. But when the substrate changes from rigid glass to flexible polyimide, LTPS TFT would face many challenges for array design, process issues related to flexible substrate, module integration, stress management, and so on. When the device experiences certain strain, the critical function layer will rupture and the electrical properties will fail when the strain exceeds their critical strain.
Recent Flexible LTPS TFT Reliability Issues: Challenges of 100,000 Repetitive Bends

Ting-Chang Chang, Bo-Wei Chen, Yu-Ju Hung (Nat’l Sun Yat-Sen Univ., Taiwan), Wei-Han Chen, Terry Tai-Jui Wang, and Tsu-Chiang Chang (ITRI, Taiwan)

In this talk, the instability of flexible low-temperature polycrystalline silicon thin film transistors (LTPS TFTs) after undergoing 100,000 iterations mechanical bending is deeply discussed. Neither metal contact crack nor degradation in the active layer, we suggest the major challenge of TFTs is how to reduce the mechanical bends-induced degradation in gate insulator (GI). By observing the I-V characteristics after undergoing 100k iterations mechanical bending at R=2mm, three kinds of degradation can be found. Firstly, there is an apparent hump generation. Besides, there is also a positive threshold voltage shift. Last but not the least, an on-current increase can be observed. These effects can be attributed to the change of GI quality. By adopting the mechanical stress simulation and electrical field simulation, the mechanical stress while bending tends to induce inhomogeneous traps in GI and further cause the carrier injection into them.