Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.
This journal is © The Royal Society of Chemistry 2023

Supporting Information for

High Performance a-IGZO TFTs with Low-Melting Point Metal Electrodes

Han He,[a] Hao Huang,*[a] Chuan Peng,[a] Guanshun Liu,[a] Jiajie Liu,[a] Sili Duan,[a] Bingsuo Zou,*[a] Da Wan,*[b]*

[a] *State Key Laboratory of Featured Metal Materials and Life-cycle Safety for Composite Structures; School of Resources, Environment and Materials; Guangxi University, Nanning 530004, China*

[b] *School of Information Science and Engineering, Wuhan University of Science and Technology, Wuhan 430081, China.*

*E-mail: hhuang@gxu.edu.cn; wanda@wust.edu.cn

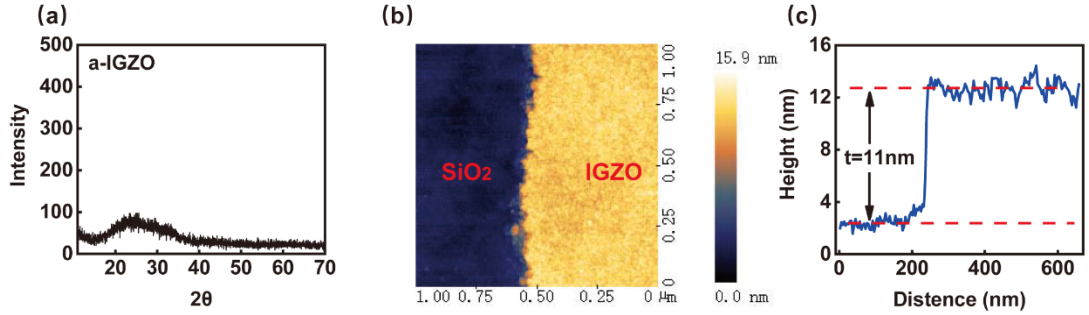

Fig. S1. (a) XRD testing of IGZO, (b) AFM at the edge of a-IGZO thin films and (c) Height difference between SiO_2 and a-IGZO thin films.

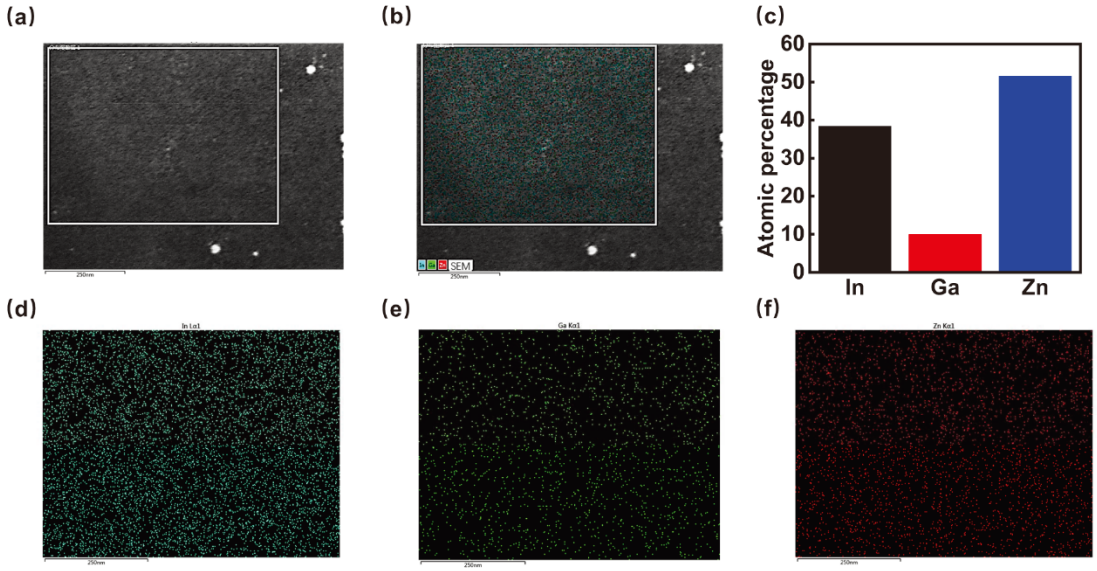

Fig. S2. EDS test of a-IGZO in (a) SEM image, (b) layered image, and (c) scanned elemental ratios of In, Ga, and Zn, and (d-f) elemental distribution maps of In, Ga, and Zn.

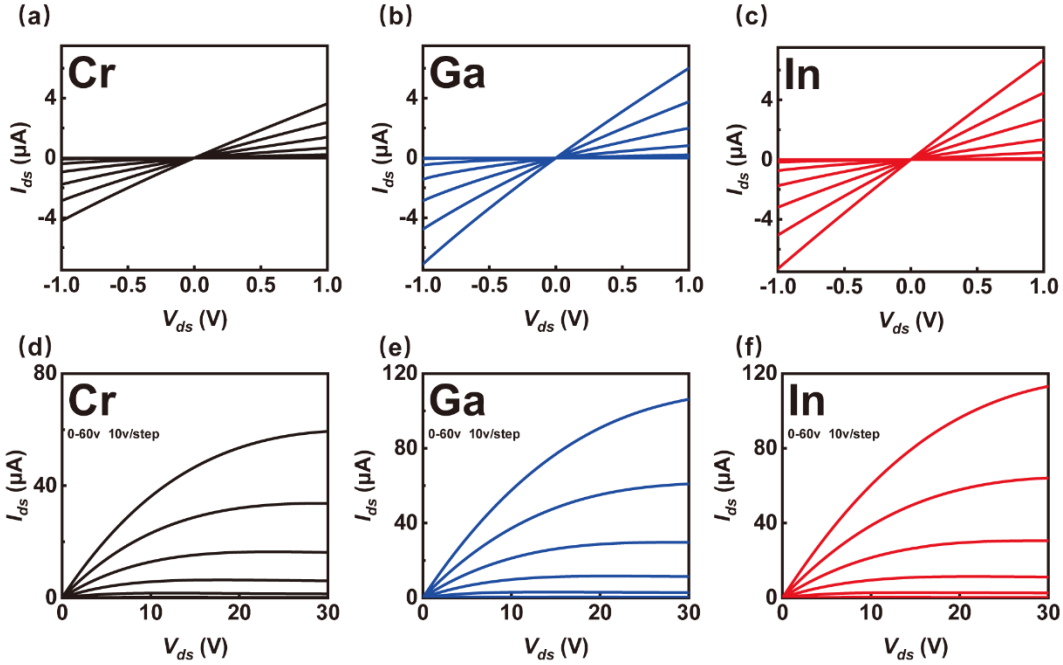

Fig. S3. I_{ds}-V_{ds} curves of (a) Cr, (b) Ga and (c) In-contacted a-IGZO TFTs.

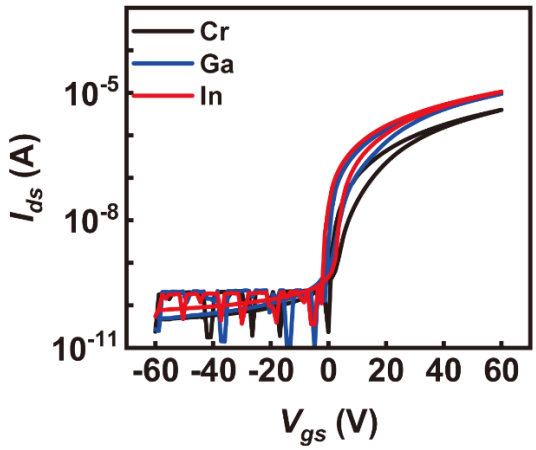

Fig.S4. Device hysteresis information.

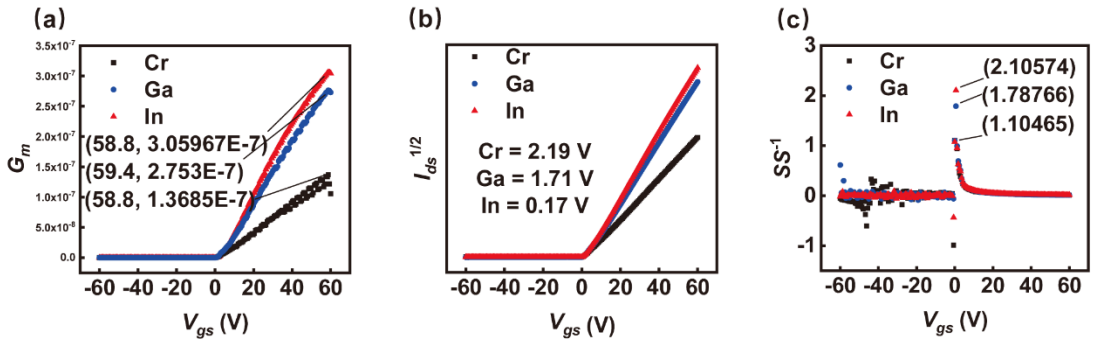

Fig. S5. Calculation procedure for μ_{FE}, V_{th}, SS of Cr, Ga, In-contacted a-IGZO TFTs.

(a) μ_{FE}:

Cr: $$\mu_{Fe} = 1.3685 \times 10^{-7} \times \frac{100}{70 \times 1 \times 34.5 \times 10^{-9}} = 5.67$$

Ga: $$\mu_{Fe} = 2.753 \times 10^{-7} \times \frac{100}{70 \times 1 \times 34.5 \times 10^{-9}} = 11.40$$

In: $$\mu_{Fe} = 3.05967 \times 10^{-7} \times \frac{100}{70 \times 1 \times 34.5 \times 10^{-9}} = 12.67$$

(b) V_{th}: After opening the root sign for I_{ds}, as shown in Fig. S3 b.

(c) SS: taking the highest point of SS^{-1} in Fig. S3, respectively.

Cr: $$SS = \frac{1}{1.10465} = 0.91$$

Ga: $$SS = \frac{1}{1.78766} = 0.56$$

In: $$SS = \frac{1}{2.10576} = 0.47$$

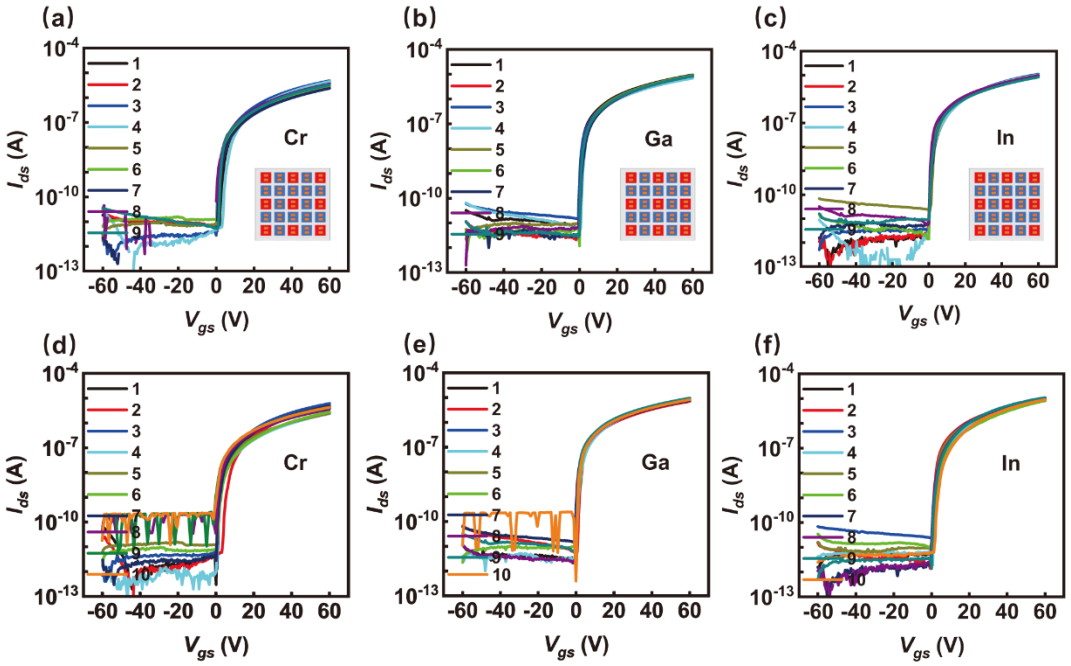

Fig. S6. (a-c) I_{ds}-V_{gs} for 9 different locations in the same device, the red part represents the device under test, (d-f) I_{ds}-V_{gs} for the same place in 5 different batches, each batch totaling two devices.

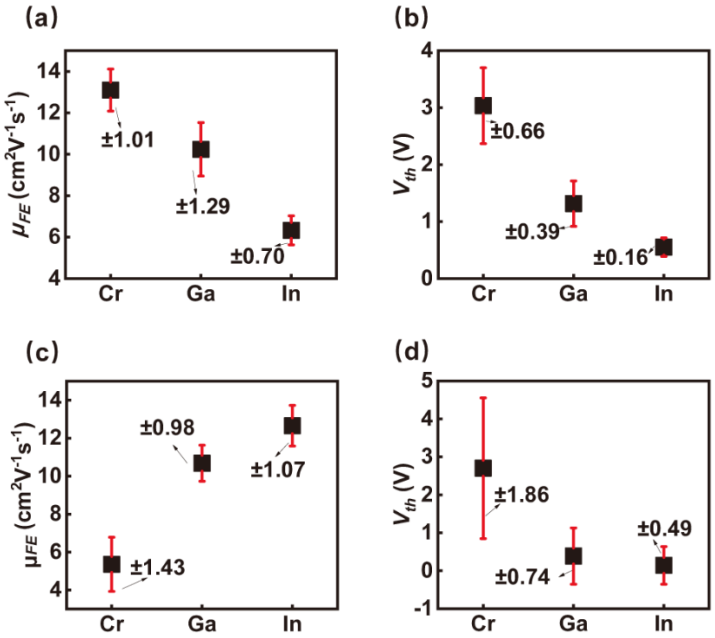

Fig. S7. (a-c) Error for 9 different locations in the same device, (d-f) error for the same place in 5 different batches, each batch totaling two devices.

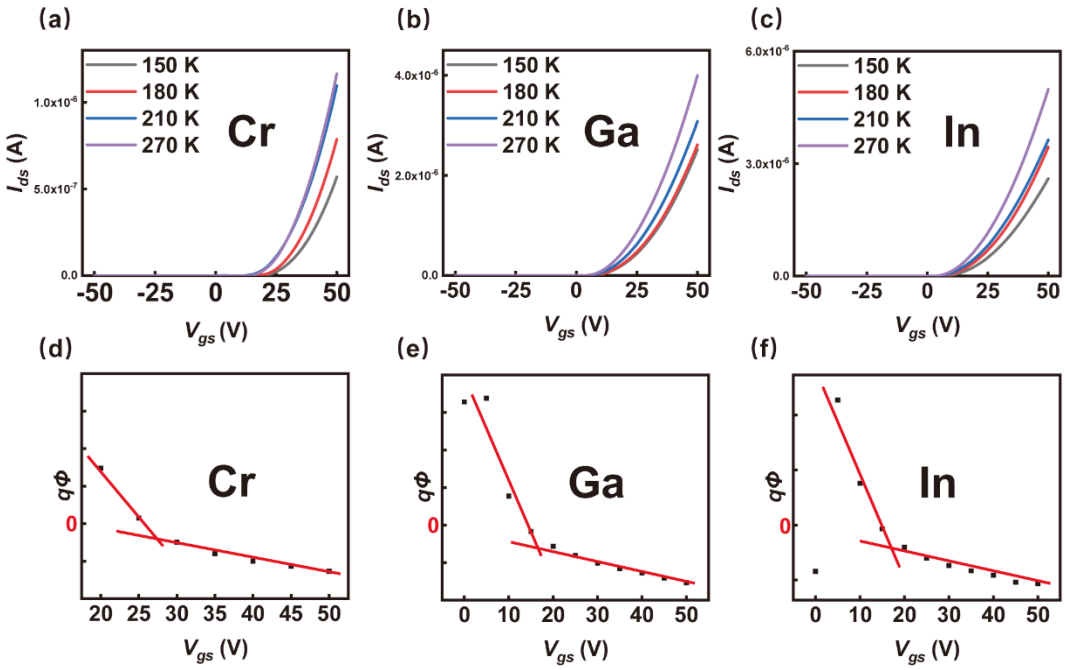

Fig. S8. the temperature-dependent I_{ds}-V_{gs} characteristics of (a) Cr, (b) Ga and (c) In-contacted a-IGZO TFTs by at temperatures of 150 K, 180 K, 210 K, and 270 K. (d-f) calculated Schottky barrier heights between IGZO thin films and Cr, Ga and In contacts.

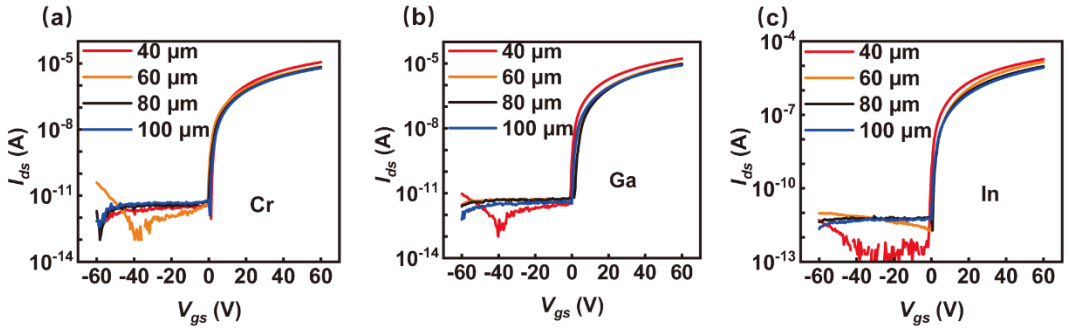

Fig. S9. I_{ds}-V_{gs} of (a) Cr, (b) Ga and (c) In-contacted a-IGZO TFTs with varying channel lengths (L=40 μm, 60 μm, 80 um, 100 μm).