

Figure 1: HAADF TEM image showing the ZnO film as-deposited. As will be seen in later slides, the white line shows the intermixing of the ZnO and Ga₂O₃

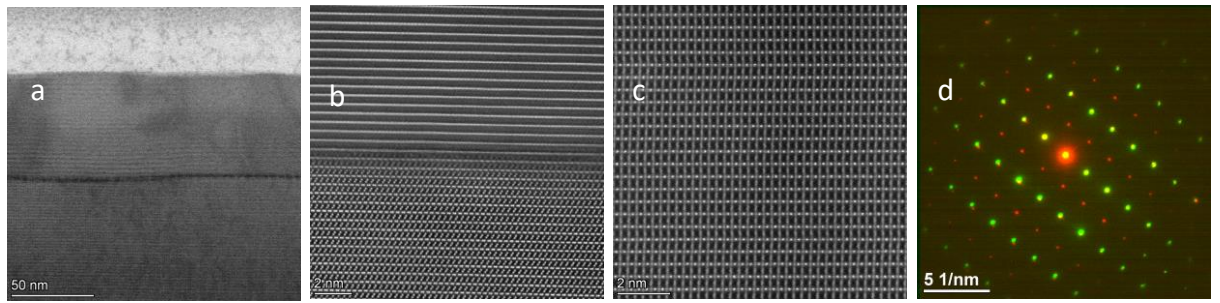


Figure 2: HAADF TEM images of the ZnGa₂O₄ film zooming in on the film (a) and interface with the Ga₂O₃ substrate (b) The color-mapped SAED is shown where red is the ZnGa₂O₄ film, and green is the Ga₂O₃ substrate. The crystallinity of the film is visible even in the TEM images, and the SAED confirms its semi-concurrent match to the Ga₂O₃ substrate

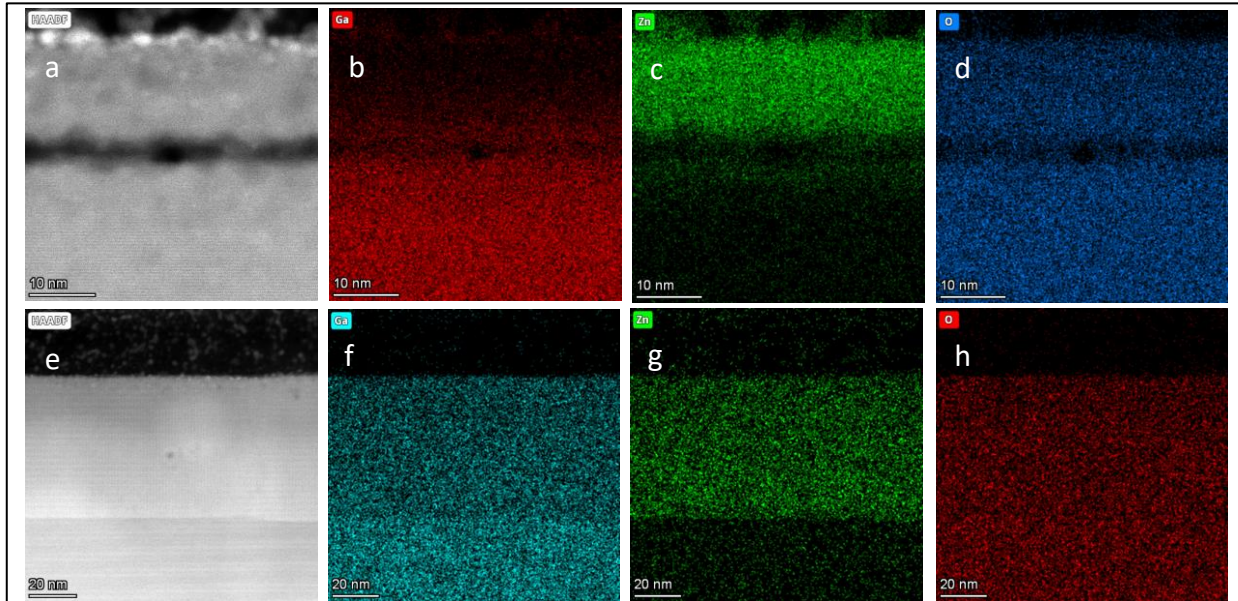


Figure 3: EDS from the TEM scans of the film as-deposited (a-d) and after annealing (e-h) show the intermixing of the ZnO and Ga₂O₃. Even at ALD temperatures, there is some intermixing, and the dark line can be seen as the interface of deposition with some Ga and Zn on either side. After high temperature annealing, the ZnO and Ga₂O₃ have fully mixed to form ZnGa₂O₄

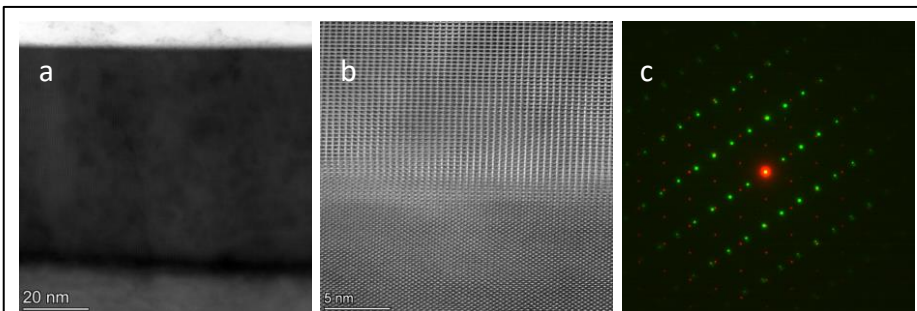


Figure 4: The large area view (BF-S) (a), interface zoom (HAADF) (b), and color-mapped SAED overlay of the ZnGa₂O₄ film on a (001) Ga₂O₃ substrate show that this technique works for the (001) orientation

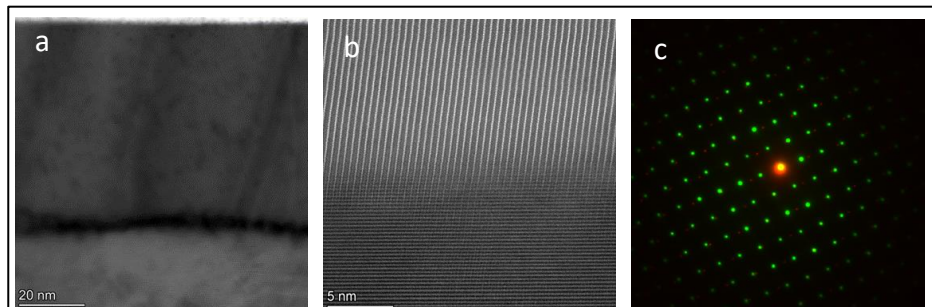


Figure 5: The large area view (BF-S) (a), interface zoom (HAADF) (b), and color-mapped SAED overlay of the ZnGa₂O₄ film on a (010) Ga₂O₃ substrate show that this technique works for the (010) orientation