Fabrication of FETs Based on La-BaSnO$_3$ Perovskite Oxide

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Primary CNF Tools Used: PVD75 sputter deposition, AJA ion mill, Oxford ALD FlexAL

Abstract:
A field effect transistor based on La-BaSnO$_3$ (BLSO) has been made. The BLSO is a perovskite oxide material with high mobility and oxygen stability. The BLSO film was grown by molecular beam epitaxy. It has been etched with the AJA ion mill to make a channel layer, and ITO is deposited on the channel layer as the source and drain contact layer by PVD75 sputter deposition. ALD-grown HfO$_2$ film was deposited on it as a dielectric oxide by Oxford ALD FlexAL. ITO is deposited again by the same tool as a gate electrode. The schematic is shown in Figure 1. The device shows good characteristic curve in terms of $I_{ds}$-$V_{ds}$ and $I_{ds}$-$V_{gs}$. The on-off ratio is over $6 \times 10^6$ and mobility is over 20 cm$^2$/V·s. The characteristic curve of the device is shown in Figure 2 and Figure 3.

Summary of Research:
Field effect transistor based on La-BaSnO$_3$ (BLSO) has been fabricated and nice characteristic curves with high on-off ratio over $6 \times 10^6$ and mobility over 20 cm$^2$/V·s has been shown.

References:

Figure 1: Schematic of the field effect transistor based on La-BaSnO$_3$.

Figure 2, left: Output characteristic curve of the device. Figure 3, right: Transfer characteristic of the device.