

# Electrical Properties of Copper Oxide Thin Films Deposited by Atomic Layer Deposition

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Recently, metal oxide semiconductors have been investigated for microelectronics device applications, such as thin film transistors (TFTs) channel layer and non-volatile memories, etc. However, most reported metal oxide semiconductors are n-type. Therefore, development of p-type metal oxide semiconductors are required for application of complementary metal-oxide-semiconductor (CMOS) using n- and p-type, and p-n junction devices.

Generally, copper oxide thin films, existing CuO and Cu<sub>2</sub>O, have p-type conductivity that they have possible application for p-channel layer of TFTs and p-n junction devices. Besides, these materials have some advantages such as low production cost and non-toxic.

In this study, copper oxide thin films are prepared using Cu(II) aminoalkoxide precursor Cu(dmamb)<sub>2</sub> [dmamb = 1 - dimethylamino - 2 - methyl - 2 - butanolate OC(Me)(Et)CH<sub>2</sub>NMe<sub>2</sub>] with water and oxygen plasma, as oxygen sources by ALD and investigated for possibility of p-channel TFTs application as a p-type semiconductor. The self-limiting ALD process was estimated by thickness of the films measured as function of the Cu(dmamb)<sub>2</sub> pulse time and the number of ALD cycles. The properties of the films were performed by XPS, AES depth-profile and AFM. To investigate the optical and electrical properties, as-grown and annealed samples were measured by UV-vis and Hall measurements.