



Electrical conduction in 10–20 nm thick polycrystalline tin oxide thin films deposited by chemical vapor deposition

Yuji Matsui^{a,*}, Yuichi Yamamoto^b

^a New Products Development Center, AGC Automotive Japan/Asia, Asahi Glass Co., Ltd. 426-1, Sumita, Aikawa-Machi, Aiko-Gun, KANAGAWA 243-0301 Japan

^b Research Center, Asahi Glass Co., Ltd. 1150 Hazawa-cho, Kanagawa-ku, Yokohama, Kanagawa, 221-8755, Japan

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ABSTRACT

Electrical properties were studied for chemical vapor deposited fluorine doped tin oxide films that were less than 20 nm thick. The electrical properties of the coatings were found to be affected by the type of additive alcohol used in the deposition process. Conductivity was superior for ethanol or isopropyl alcohol (IPA) compared to methanol. Hall effect measurements showed that mobility and carrier concentration were best for IPA, less for ethanol, and least for methanol. Influence of carrier scattering factors to electrical properties was speculated. Potential barrier for carrier scattering at grain boundaries was estimated to be lower in an IPA-added film compared to methanol-added films. Experimental results suggested electrical properties were influenced by size and density of tin oxide micro-grains. It was concluded that interconnections between the micro-grains increased mobility and carrier concentration of very thin films.

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