QUANTITATIVE EVALUATION OF NI CONCENTRATION ON AMORPHOUS SI AT THE PPB LEVEL USING MICROSAMPLE X-RAY ANALYSIS

Hyun Ja Kwon, Kyu Ho Park, Jeong Soo Lee
LG Electronics Institute of Technology, Seoul, Korea
Bin Kim
LG.Philips LCD Research Center, Anyang, Korea
Hak Ro Yun, Gerald Lee
Alpha Science Corp., Seoul, Korea
James R. Bogert, David Leland
Thermo NORAN, Middleton, WI.

It has been generally accepted that polycrystalline silicon (poly-Si) films are preferable for active matrix liquid crystal displays (AMLCDs) rather than amorphous Si (a-Si) films to achieve high definition and fast response time. Since poly-Si thin film transistors (TFTs) should be made on inexpensive glass substrates for the low fabrication cost, it is indispensable to decrease the crystallization temperature of a-Si films as low as possible. One of the most effective methods lowering crystallization temperature is metal induced crystallization (MIC). In the MIC technique, a small quantity of metal is deposited on a-Si films before crystallization. The MIC process, however, has a serious problem of undesirable incorporation of metal impurities into the crystallized Si films. Recently, it was reported that Si crystallization is enhanced in the presence of electric field even with a smaller amount of metal deposition (ppb level). In order to use this process for large area applications, it is essential to control the amount and uniformity of metals on a-Si films precisely.

In this work, we investigated concentration and uniformity of Ni deposited on a-Si(500)/SiO_2(3000)/Glass substrates at the ppb level using microsample x-ray analysis (MXA). The concentration of Ni deposited on a-Si films varied from $3x10^{13}$ to $5x10^{14}$ atoms/cm^2 with sputtering conditions. The accuracy of MXA results is compared with that of TOF-SIMS analysis. The Ni atoms were distributed on large area a-Si films with the uniformity of 3~5% from the considerations of instrument and method precision.