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ANALYSIS OF THIN FILM POLYSILICON ON GLASS SYNTHESIZED BY MAGNETRON SPUTTERING

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Thin films of polycrystalline silicon (poly-Si) is a promising material for use in large-area electronic devices. Especially, the poly-Si can be used in high resolution and integrated active-matrix liquid-crystal displays (AMLCDs) and active matrix organic light-emitting diodes (AMOLEDs) because of its high mobility compared to hydrogenated amorphous silicon (a-Si:H). A number of techniques have been proposed during the past several years to achieve poly-Si on large-area glass substrate. However, the conventional method for fabrication of poly-Si could not apply for glass instead of wafer or quartz substrate. Because the conventional method, low pressure chemical vapor deposition (LPCVD) has a high deposition temperature (600℃-1000℃) and solid phase crystallization (SPC) has a high annealing temperature (600℃-700℃). And also these are required time-consuming processes, which are too long to prevent the thermal damage of corning glass such as bending and fracture.

The deposition of silicon thin films on low-cost foreign substrates has recently become a major objective in the search for processes having energy consumption and reaching a better cost evaluation. Hence, combining inexpensive deposition techniques with the growth of crystalline silicon seems to be a straightforward way of ensuring reduced production costs of large-area electronic devices.

We have deposited crystalline poly-Si thin films on soda-lime glass and SiO_2 glass substrate as deposited by PVD at low substrate temperature using high power magnetron sputtering method. The epitaxial orientation, microstructual characteristics and surface properties of the films were analyzed by TEM, XRD, and AFM. For the electrical characterization of these films, its properties were obtained from the Hall effect measurement by the Van der Pauw measurement.