

The Properties of Inductively Coupled Plasma Oxidized Polysilicon Films and Thin Film Transistors

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Inductively coupled plasma (ICP) has the advantages of large area capability, high plasma density, and low sheath voltage. We investigated the properties of ICP oxidized polysilicon films and thin film transistors (TFTs). The Si-SiO₂ interface of the ICP oxidized polysilicon is much smoother than that of the thermally oxidized polysilicon. The ICP oxidation in oxygen plasma passivated the dangling bonds in the poly-Si films not by oxygen incorporation but by hydrogen incorporation. But the incorporated hydrogen diffused out during the TFT fabrication so that the effect of the dangling bond passivation was not obtained in the TFT. The ICP oxidation did not remove the intragranular defects such as microtwins and stacking faults, but it reduced the interface trap density and improved the performance of the poly-Si TFT. The field effect mobility of TFT with an ICP oxide/LPCVD oxide double layer was 30.6 cm²/Vs, while that of TFT with an LPCVD oxide was 17.2 cm²/Vs.

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