

Low temperature polysilicon TFTs on polyimide substrates for flexible electronics

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In this work we present a novel process to fabricate low-temperature poly-silicon (LTPS) TFTs on flexible substrates. In particular, we fabricated non self-aligned LTPS TFTs on polyimide (PI) layers spin-coated on Si-wafer, used as rigid carrier, overcoming difficulties in handling flexible freestanding plastic substrates and eliminating the problem of plastic shrinkage with high processing temperatures. The device active layer was crystallized using excimer laser annealing while the gate oxide was deposited using electron cyclotron resonance PECVD. After TFTs fabrication, the PI layer is mechanically released from the Si-wafer and the devices have been electrically characterized under different bending conditions. In addition, hot carrier and self-heating related instabilities have been studied and analysed by using numerical simulations.

Simple circuits, such as inverters and ring oscillators, have been fabricated using the proposed process and tested.

Keywords: polycrystalline silicon TFTs, excimer laser annealing, self-heating

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