

## FLEXIBLE LOW TEMP GATE INSULATORS FOR ORGANIC FIELD EFFECT TRANSISTORS

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We have manufactured flexible field effect transistors with low molecular weight pentacene and low temperature deposited silicon dioxide by ECRCVD on polyethersulfone (PES). Researches on gate insulator in organic thin film transistors (OTFTs) have been made by two aspects; inorganic dielectrics of high dielectric constant and good adhesive stability and organic dielectrics of sustaining up to relatively high temperature<sup>1,2</sup>. Gate insulators have a very thin thickness of 70nm, a capacitance in excess of  $5\text{nFcm}^{-2}$  and deposited at below of  $100^{\circ}\text{C}$ .

For organic TFTs, we used Al/Cr double layers as a gate metal and Ti/Au double layers as a source/drain metal. And we used organic pentacene as an active layer by using a thermal evaporation. Silicon dioxide for a gate insulator was formed on PES substrates by ECRCVD using  $\text{SiH}_4$  and  $\text{O}_2$  gases under the condition of microwave power of 100W, RF power of 100W, and magnetic current of 50A.

For the electrical characteristics of the device, the capacitor area for the MIM structure was  $100 \times 100 \mu\text{m}^2$  by using Ti/Au electrodes. The physical thickness of silicon dioxide film made by ECRCVD was about  $2000\text{\AA}$ . The capacitance and current-voltage (I-V) were measured using LCR meter and HP4145B semiconductor parameter analyzer, respectively.

In this study, we have manufactured an organic thin film transistor with a gate insulator of  $\text{SiO}_2$  formed at low temperature below of  $100^{\circ}\text{C}$  by ECRCVD. Figure 1 shows the refractive index of silicon oxide films formed on PES substrates as a function of RF power. Figure 2 shows a picture of the flexible organic TFTs manufactured on PES plastic substrates. These enable an organic thin film transistor manufacturable on plastic substrates

### References

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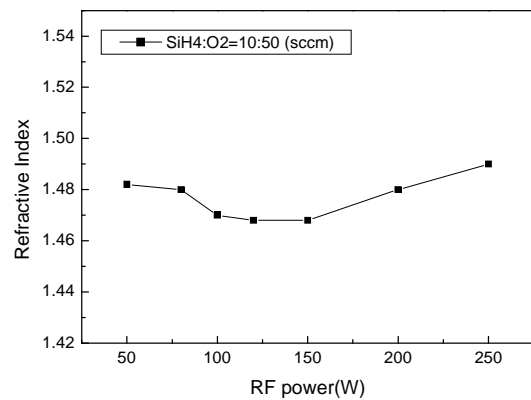


Fig.1 The refractive index of silicon oxide films formed on PES substrates as a function of RF power.



Figure 2 A picture of the flexible organic TFTs manufactured on PES plastic substrates.