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Characterization of Sexithiophene(α -6T) thin films grown by Organic Molecular Beam Deposition(OMBD) technique for organic thin film transistors

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Conducting polymers with π-conjugated double bonds in their backbone have band structures similar to those of inorganic semiconductors such as silicon. It is well known that amorphous silicon(a-Si) thin film transistors (TFTs) are used in large-area liquid-crystal displays for switching liquid crystals. On the other hand, a lot of efforts have been devoted to fabricate TFTs with conducting polymers from the standpoints of low-cost and flexible TFT production. One of the most important parameters for TFTs characteristics is carrier mobility. There are mainly two approaches to improve carrier mobility. One approach is to use highly purified thiophene oligomers in order to reduce the carrier scattering by impurities. The other approach is to use conducting polymers with large π-conjugation length having smaller bandgap energy.

The former approach for insulated-gate TFTs was seleted to obtain the higher carrier mobility in organic TFTs. In this study, thin films of Sexithiophene(α-6T) were prepared on various substrates by Organic Molecular Beam Deposition(OMBD) method. The crystalline structures of α-6T thin films grown at various conditions were investigated by X-Ray Diffractometry. The molecular orientation and surface morphology of these films were studied by using angle-resolved polarized electronic absorption spectroscopy and Atomic Force Microscopy, respectively. The electrical conductivity of these films with a direction parallel and perpendicular to the substrates were also measured. Further details will be discussed.