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巨大ドメイン構造をもつビススチリルアントラセン誘導体薄膜の光学物性

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OPTICAL PROPERTIES OF ORGANIC THIN FILMS WITH GIANT DOMAIN STRUCTURE COMPOSED OF BISSTYLYLANTHRACENE DERIVATIVES.

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Glassy amorphous solid thin films are now used for organic semi-conductive devices, e.g. organic light emitting diode due to their homogenous morphology and carrier transport property. It is, however, sacrificed in the amorphous film, the utilization of the intrinsic properties of MOLECULES such as optical anisotropy and π-π stacking with high carrier transportation. We synthesized some bisstyrylanthracene derivatives which have rigid aromatic core and soft alkyl segments (Fig.1) and prepared thin films by a simple melt-coagulation procedure in sub-micron spacing cells to obtain an ordered molecular array with large domain size.

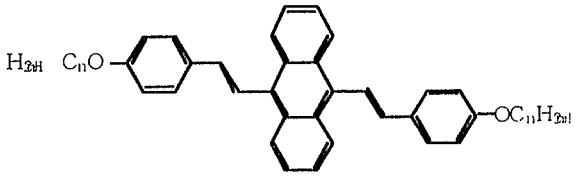

Fig. 1 molecular structure of BSA derivatives

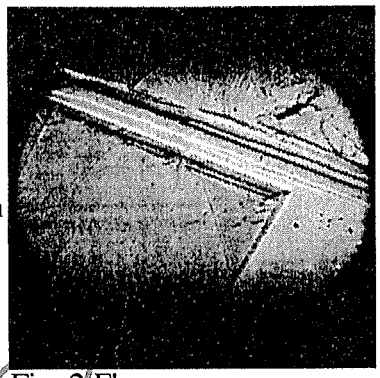

Fig. 2 Fluorescence micrograph of BSA-18 Film

The fluorescence micrograph of the prepared BSA-18 film (Fig. 2) clearly showed that the domains grew up to a few mm size and that the homogenous emission from the domain has significant anisotropy. The differential scanning calorimetry reveled that the BSAs with alkyl chains longer than 10 carbons undergo two phase transitions (Fig.3) and take a crystal state at room temperature.

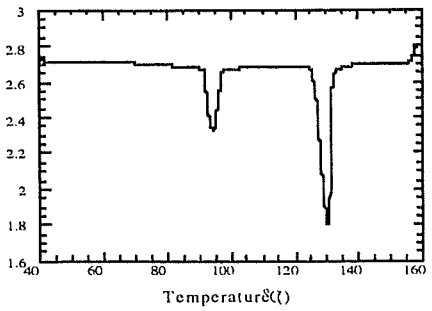

Fig. 3 DSC of BSA-18

The X-ray diffraction of the BSA films at room temperature indicated that the film had a layered structure parallel to the substrate surface with a spacing slightly shorter than the molecular length. It was speculated that the BSA molecules arranged in a microsegregation manner with the tilt angle from the surface normal at ca. 30. Since the transition moment of S_0-S_1 was simulated to lie along the molecular axis, the large anisotoropy of the fluorescence in the domain can be explained in terms of the molecular orientation.