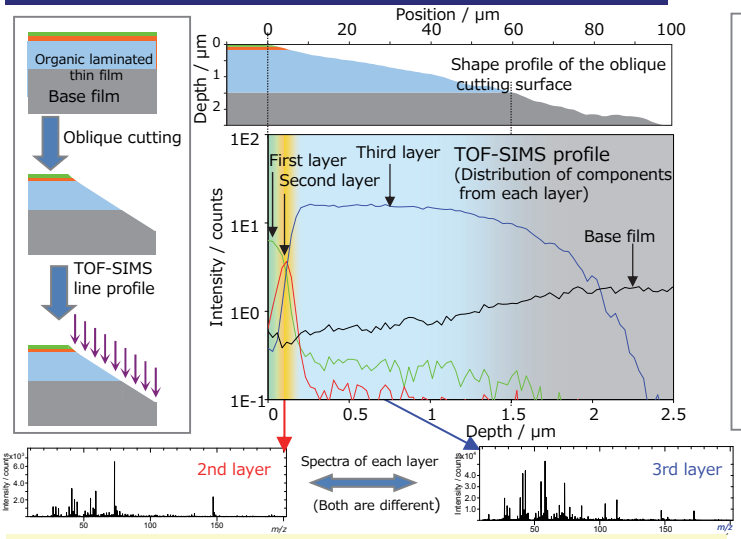
Analysis of liquid crystal impurities and optical films for LCD panels

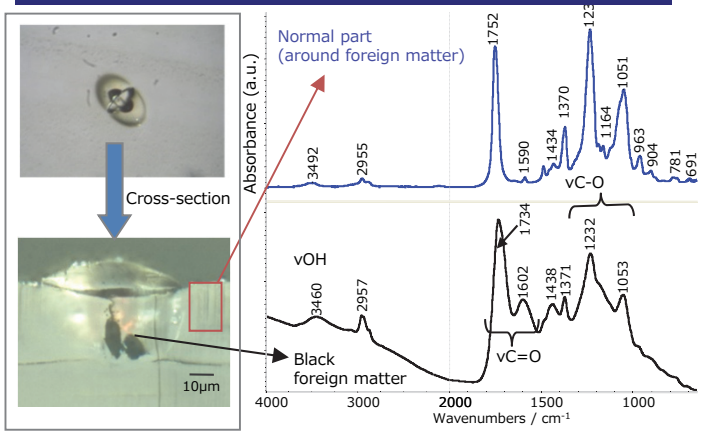
1. Chemical structure of the organic laminated film by precise oblique cutting +TOF-SIMS
2. Qualitative analysis of the foreign substances by microsampling + FT-IR
3. Identifying of the diffusion of sealant components into the liquid crystal in the model testing (HPLC and LC/MS) of LCD manufacturing process

1. Qualitative Analysis of Multilayer Films by Gradient Shaving Preparation + TOF-SIMS Analysis



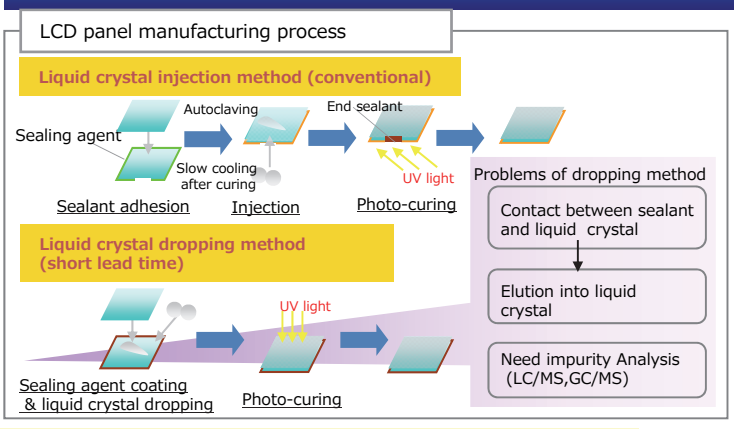
・Precision oblique cutting + TOF-SIMS spectrometry shows three organic laminated thin films (100 nm/100 nm/1.3μm) with TOF-SIMS spectra of each layer.
・Comparing analysis with each layer between samples with different conditions is possible.

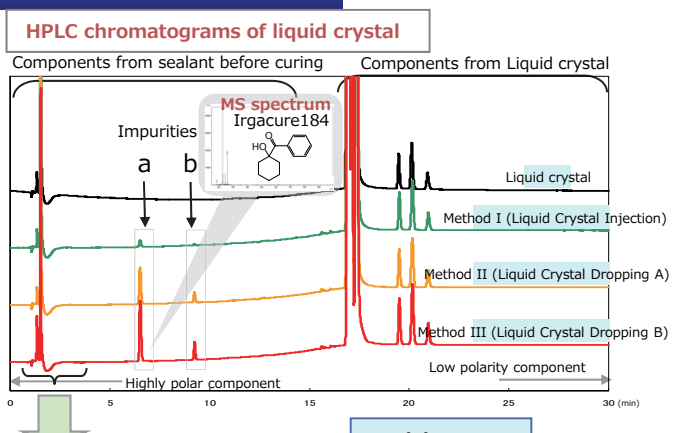
2. Analyzing of foreign matters in Multilayer Films by Microsampling + Microscopic FT-IR



・Microsampling + microscopic FT-IR spectrometry on the foreign matter (10μm) shows multiple absorption bands similar to the normal part. OH bond, C=O bond is distinctively strong, and broad spectral shape is different with normal parts.
・The foreign matter is estimated to be derived from heat denaturation of the normal part (film ingredient).

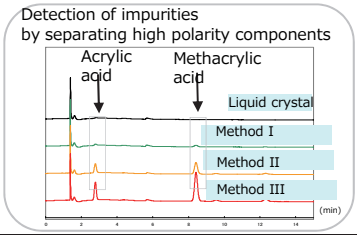
3. Analyses of Liquid Crystal Impurities from Manufacturing Processes (Liquid-to-Liquid Contacts) Using HPLC





After the mockup test of liquid crystal panel manufacturing shows ;

- More impurities were found in the process of higher temperature after sampling of the liquid crystal in liquid-liquid contact and the pre-cure sealant by HPLC and LC/MS
- Succeeded to identify four types of components derived from the sealing agent by Qualitative analysis of the impurity ingredients



Model process

Method I (Liquid Crystal Injection)
: After curing of sealing agent, contact with liquid crystal

Method II (Liquid Crystal Dropping A)
: Hardening treatment after contacting of pre-cure sealant and liquid crystal at RT

Method III (Liquid Crystal Dropping B)
: Hardening treatment after contacting of pre-cure sealant and liquid crystal at a high temperature

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INNOVATION IN EXCELLENCE UP.

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