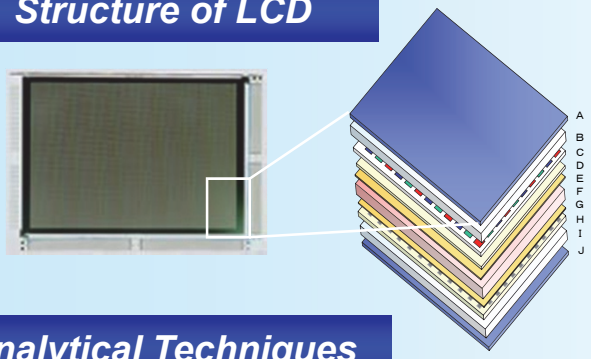
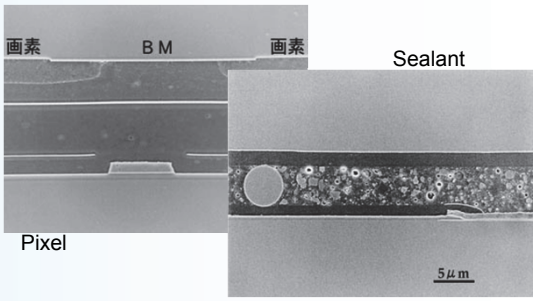
Analytical Techniques Available for LCDs

Structure of LCD



A:Polarizer
B:Substrate
C:Color Filter
D: ITO
E: Alignment Layer
F: Liquid Crystal
G: Alignment Layer
H: TFT
I: Substrate
J: Polarizer



SEM Vertical Image

Analytical Techniques

For Materials

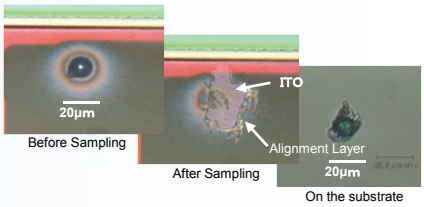
Part/Material	Objective/Items of Analysis	Applicable Techniques
Liquid Crystal	Impurities	ICP-MS(～60 elements)
		Ion Chromatography
	Compositon	GC, GC/MS, HPLC, etc.
	Structure Analysis	X-ray Diffraction(XRD)
Substrates	Contamination	XPS, TOF-SIMS
		Micro FT-IR
	Surface Roughness	AFM
ITO	Compositon	RBS・XPS
	Crystalinity	XRD
	Oxidation Number of Sn Oxygen Vacancy around Sn	^{119}Sn Moessbauer
	Surface Roughness	SEM・AFM
Color Filters	Surface Impurities	TOF－SIMS
	Surface Roughness	AFM
	Thermal Decomposition Analysis(Water)	TG-MS
	Thermal Decomposition Analysis(Other Gases)	TG－MS or GC/MS
	Pigment Composition	Micro FT-IR, Raman Microprobe
	Foreign Particle, Composition of Binder	Micro FT-IR, SEM-XMA
Alignment Layers	Compositon	Hydrolysis and Substitutive GC/MS
		FT-IR, NMR, Pyrolysis GC/MS
	Orientation	FT-IR
	Thermal Decomposition analysis(Water)	TG-MS
	Thermal Decomposition Analysis(Other Gases)	TG-MS or GC/MS
	Foreign Particle and Surface Contamination	Micro FT-IR
		TOF-SIMS
TFT	Granular Variation and Orientation Analysis of poly-Si	EBSP/EBSD
	Distribution of Impurities	SIMS
	Dopant Imaging	SCM,SSRM
	Impurities in SiN, SiO2 layers	SIMS
	Impurities in a-Si and poly-Si layers	SIMS
	Defect in a-Si and poly-Si layers	ESR
Others	Sealant, Molding resin, Polarizing Plate, Rubbing Cloth, etc.	

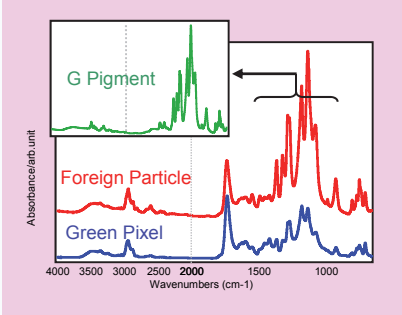
For LCD Panel (Defect Screening)

Part/Material	Objective/Items of Analysis	Applicable Techniques
Alignment Layers	Degradation of Alignment Layers and Adsorbed Impurities	Micro FT-IR(Degradation, Contaminants)
		TOF-SIMS(Impurities)
Liquid Crystal	Quantitative and Qualitative Analysis of Ionic Substance	Ion Chromatography
	Elemental Analysis	ICP-MS (Metal)
		Organic Elemental Analysis
	Organic Impurities and Degradation Prouct	Gas Chromatography
		GC/MS
Bubbles	Composition	Raman
		TG-MS
Foreign Particles	Morphological Analysis	SEM, TEM
	Composition	Micro FT-IR, SEM-XMA, Micro-MS

Examples

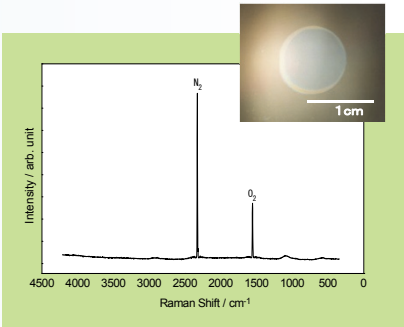
Foreign Particle Analysis on CF using Micro FT-IR





Small particles as well as alignment layers are able to be measured by our skillful “Micro-Sampling Method”

Analysis of Bubble in LCD using Raman Spectroscopy



Composition of a small quantity of gas in a LCD panel can be analyzed using our original sampling method.