Latest IR spectroscopy with sub-micron spatial resolution

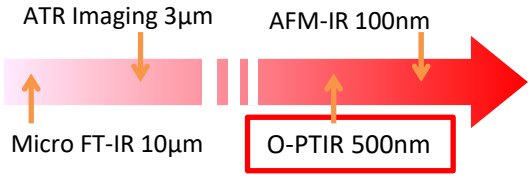
Optical Photothermal IR Spectroscopy (O-PTIR) enables the infrared measurement with a high spatial resolution of less than 1 μm. It can be applied to analyze the composition of small foreign substances, the interface composition of multi-layered samples, and even water containing sample.

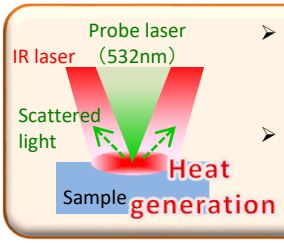
O-PTIR (Optical Photothermal IR Spectroscopy)

◇ Characteristics of O-PTIR

IR spectrum and imaging with sub-micron (around 500 nm) spatial resolution
Same spectra as conventional FTIR
Non contact measurement with reflection mode, no need of complicated sample preparation , such as thin specimen

μm to nm level IR spectra available at TRC





- Sample absorbs IR laser and diffuse its energy as heat, which cause sample deformation.
- Collimated visible laser (532 nm) detects the sample deformation, which can be transferred as IR spectrum

◇ Application of O-PTIR

Industrial and medical polymer materials
Biological materials (Hair, skin, tissues)
Medicines and medical devices
Foreign substances

◇ Information we can provide

Composition and its distribution (layer composition, foreign substance material diffusion etc.)
Reaction and / or degradation distribution, cure extent

◇ Raman spectrometer available

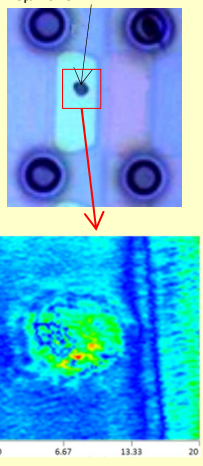
Simultaneious measurement of Raman and IR on the same sample with sub-micron spatial resolution

Application

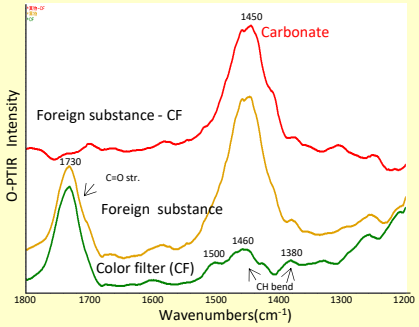
Foreign substance

Foreign substance on LCD panel

Foreign substance around 10μm size



O-PTIR Intensity image of 1450cm^{-1}



O-PTIR spectra of foreign substance and CF

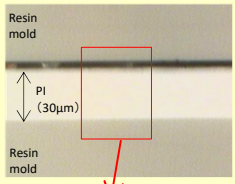
Foreign substance : Carbonate

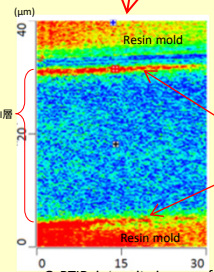
Few μm sample can be analyzed without sampling, in non-contact way

Depth profile of PI degradation

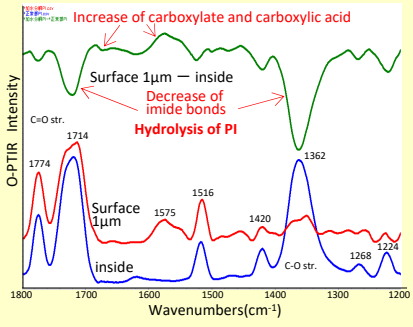
Hydrolysis distribution in PI film

PI film after alkali treatment, cross section of the film





O-PTIR intensity image of 1580cm^{-1}



O-PTIR spectra of surface 1μm and inside of PI film

Hydrolysis proceeds from surface to 1 μm in depth

Composition change can be detected at sub-micron spatial resolution

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