

# Hydration Structure of Poly(vinyl acetate) Investigated by In Situ ATR-IR Spectroscopy

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**Summary:** A sorption process of water into a poly(vinyl acetate) (PVAc) film was investigated by in situ attenuated total reflection infrared (ATR-IR) spectroscopy. A set of the obtained spectra were analyzed by means of multivariate curve resolution (MCR).

**Introduction:** Our recent studies demonstrated that in situ ATR-IR spectroscopy is a powerful tool for investigation of hydration structures in wet polymers.<sup>1,2</sup> In the present study, this method was applied to a film sample of PVAc.

**Methods:** Figure 1 shows a schematic illustration of flow trough cell designed for in situ ATR-IR spectroscopy. A PVAc film was prepared on a flat surface of a prism. Time-dependent ATR-IR spectra during a sorption process of water into the film were recorded using an FT-IR.

**Results and Discussion:** Figure 2 shows the obtained spectra. A broad feature in the 3600-3000  $\text{cm}^{-1}$  region assigned to water shows gradual increasing with spectral shape variation. This represents structure change in water hydrated to the polymer chain. Obtained spectra were decomposed into three contributions by MCR. Detailed structure change will be discussed.

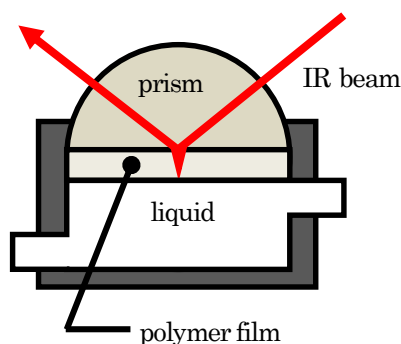


Figure 1. Schematic illustration of the in situ ATR-IR cell.

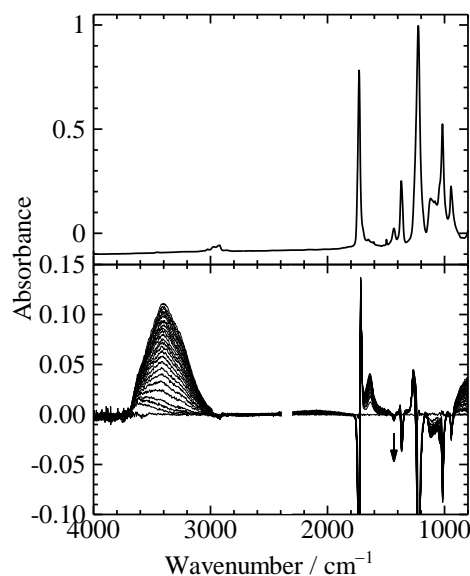


Figure 2. Time-dependent ATR-IR spectra during a sorption process of liquid water into a PVPh film.

## References:

1. S. Morita, M. Tanaka, Y. Ozaki, *Langmuir*, 23, 3750-3761, 2007
2. S. Morita, M. Tanaka, *Langmuir*, 30, 10698-10703, 2014
3. A. Tanabe, S. Morita, M. Tanaka, Y. Ozaki, *Applied Spectroscopy*, 62, 46-50, 2008