Supporting information

Hydration Capabilities and Structures of Carbonyl and Ether Groups in

Poly(3-(2-methoxyethyl)-N-vinyl-2-pyrrolidone) Film

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Fig. S1. (a) The spectra and second derivative of OH band at different sorption time. (b) Differential spectrum and second derivative of OH band.

To obtain exact fitting results, the differential spectrum and second derivative are calculated from original water sorption spectra.



Fig. S2. Relative areas of 1664 cm⁻¹ of the hydrated C=O in MeOE-PVP film are plotted against the areas of the 1680 cm⁻¹ component during absorption process. The ratio of the molar absorption coefficient is calculated from the slope of the fitting line, $\epsilon 1664/\epsilon 1680 = 0.96$.

It is well known that H-bonding structures could lead to the changes of absorption coefficient in FTIR spectroscopy. To better evaluate the ratio changes of different chemical groups, the ratios of the molar absorption coefficient are obtained from the slope of the fitted line.



Fig. S3. Relative areas of 1103 cm⁻¹ of the hydrated C-O in MeOE-PVP film are plotted against the areas of the 1124 cm⁻¹ component during absorption process. The ratio of the molar absorption coefficient is calculated from the slope of the fitting line, $\varepsilon 1103/\varepsilon 1124 = 0.90$.

Table S1. Fitting integrated areas of (de)hydrated C=O and C-O groups at the initial and ending absorption.

Absorption time/min	A1680	A1664	A1124	A1103	
0.25	28.1	7	7.6	11.3	
12.75	23.3	11.9	7.1	11.8	
Increased proportion		70.0%		4.4%	

According to the changes of integrated areas, hydrated structures of C=O and C-O can be calculated.



Fig. S4. Relative areas of 1666 cm⁻¹ of the hydrated C=O in MeOE-PVP film are plotted against the areas of the 1684 cm⁻¹component during evaporation process. The ratio of the molar absorption coefficient is calculated from the slope of the fitting line, $\epsilon 1666/\epsilon 1684 = 0.94$.