Supporting Information

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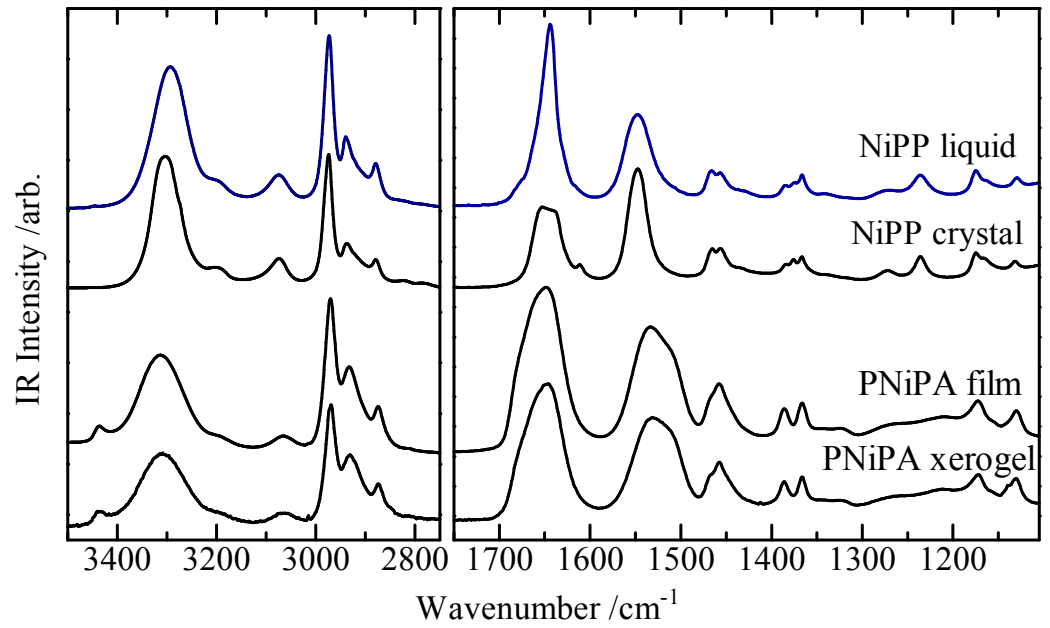
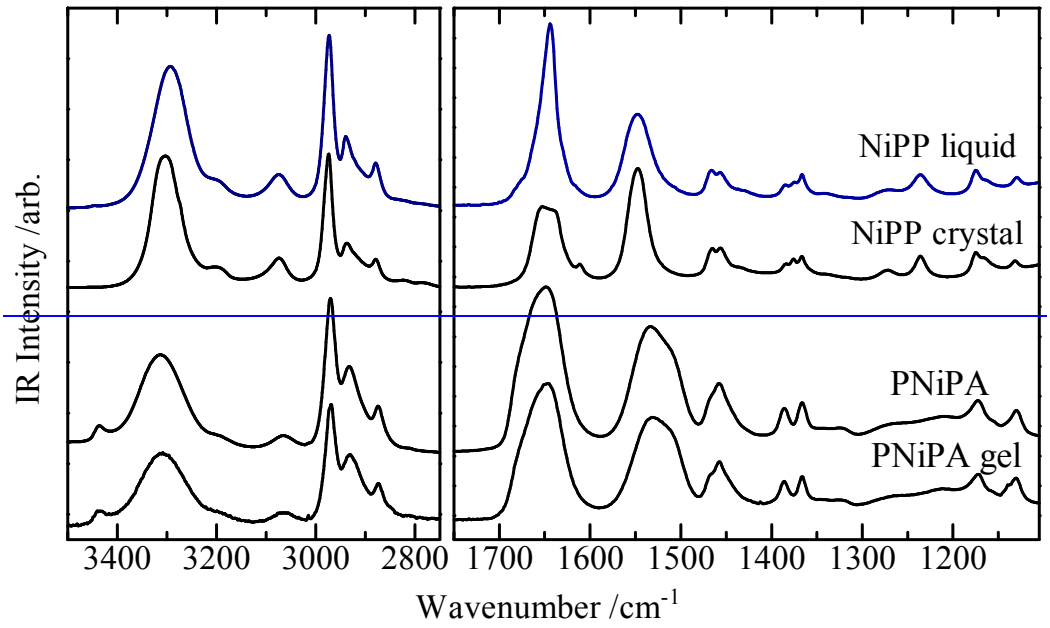
Figure A displays the IR spectra of NiPP, PNiPA, dEP and PdEA in the neat state. Figure B shows~~is~~ the IR spectra ~~of various concentrations~~ of NiPP aqueous solutions with various concentrations ~~in H_2O~~ and their 2nd derivatives. Figures C-J ~~display~~exhibit the IR spectra of ~~various concentrations of~~ *N*-alkylamides (*N*-isopropylacetamide (NiPA), *N*-n-propylpropionamide (NnPP), *N*-ethylpropionamide (NEPA), *N*-methylacetamide (NMA)) and *N,N*-dialkylamides (*N*-ethyl-*N*-propylpropionamide (EnPP), *N,N*-diethylacetamide (dEA), *N,N*-dimethylpropionamide (dMP), *N,N*-dimethylacetamide (dMA)) in aqueous solutions with various concentrations and their 2nd derivatives. The wavenumbers of the amide I bands are listed in Table I. Figure K presents~~is~~ the IR spectra of (D-)PNiPA and PdEA films in the amide I band region. Figure L depicts ~~is~~ the IR spectra of D-PNiPA and 0.74 mol% PdEA in D_2O below and above the phase transition temperature.


IR Intensity /arb.
NiPP liquid
NiPP crystal
PNiPA film
PNiPA xerogel
3400
3200
3000
2800
1700
1600
1500
1400
1300
1200
Wavenumber /cm-1


IR Intensity /arb.
NiPP liquid
NiPP crystal
PNiPA
PNiPA gel
3400
3200
3000
2800
1700
1600
1500
1400
1300
1200
Wavenumber /cm-1

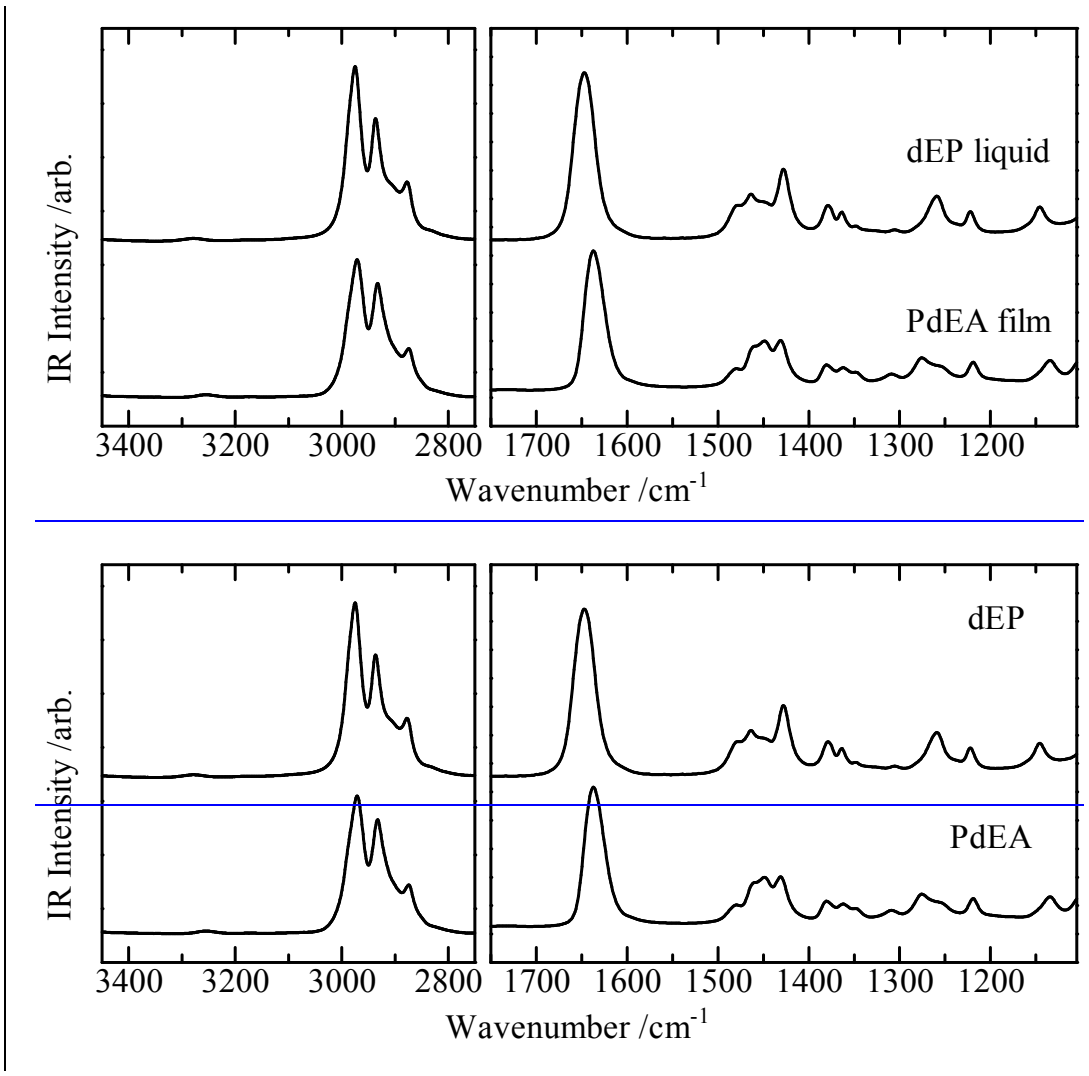


Figure A. IR spectra of NiPP, PNiPA, dEP and PdEA in the 3450-2750 and 1750-1100 cm^{-1} region.

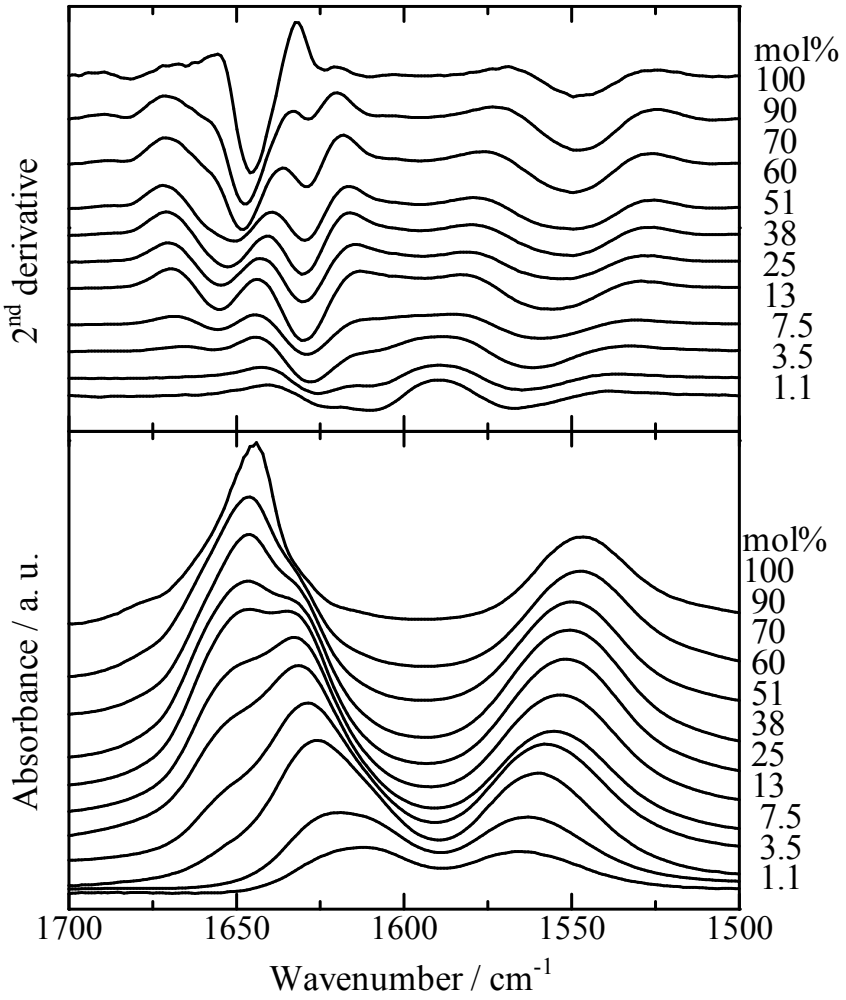
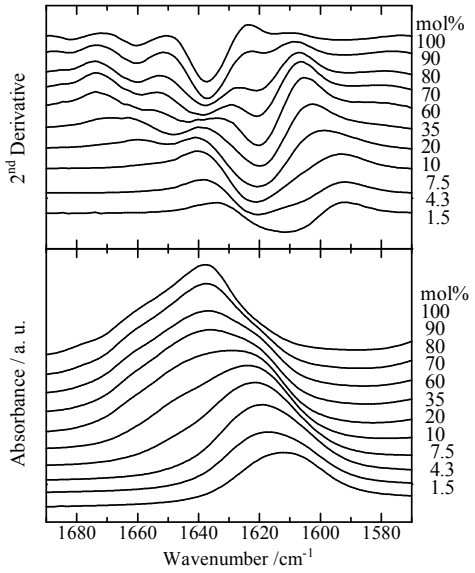


Figure B. IR spectra of various concentrations of NiPP in H_2O and their 2nd derivatives.

(a)



(b)

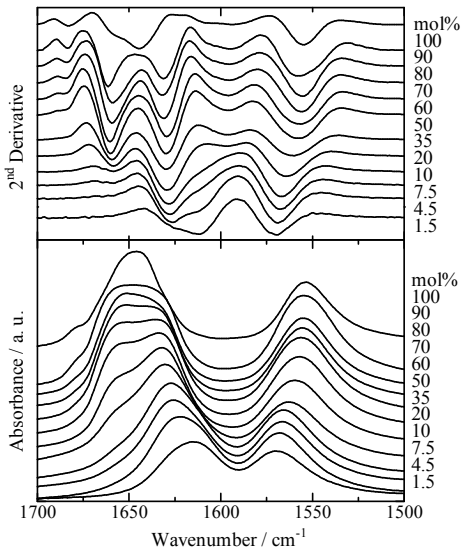
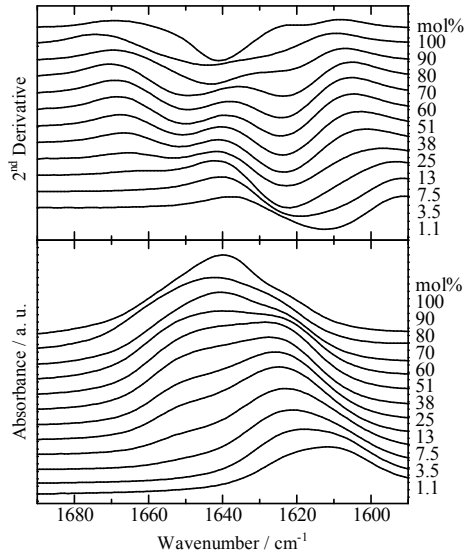


Figure C. IR spectra of various concentrations of deuterized *N*-isopropylacetamide (D-NiPA) in D_2O (a) and NiPA in H_2O (b) and their 2nd derivatives.

(a)



(b)

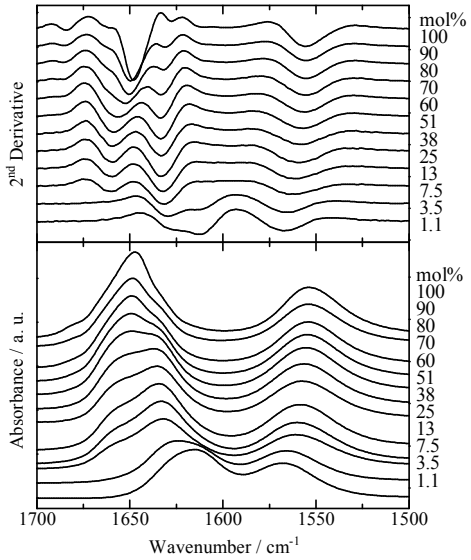
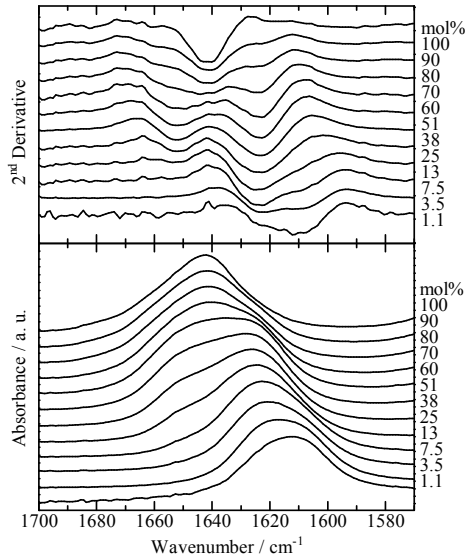


Figure D. IR spectra of various concentrations of deuterized *N*-n-propylpropionamide (D-NnPP) in D_2O (a) and NnPP in H_2O (b) and their 2nd derivatives.

(a)



(b)

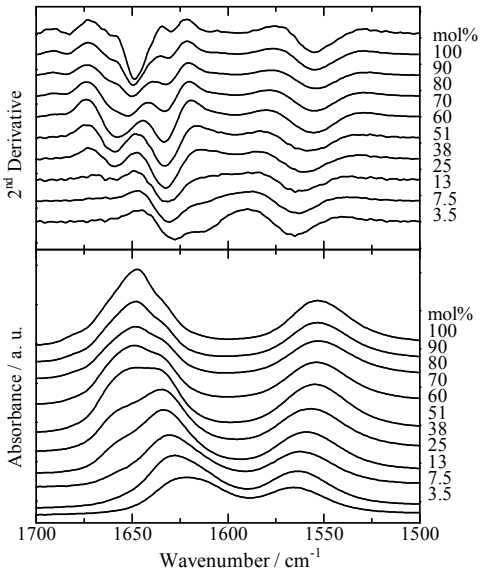
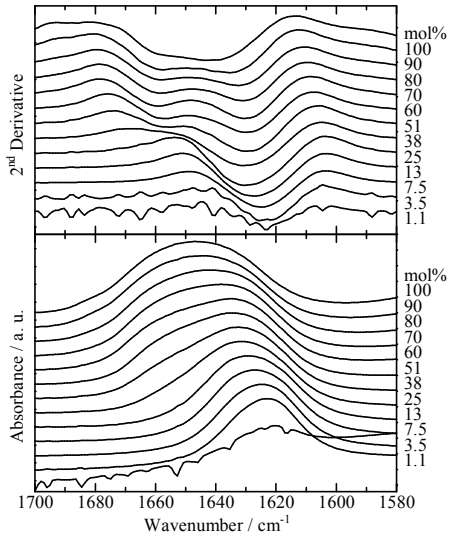


Figure. E. IR spectra of various concentrations of deuterized *N*-ethylpropionamide (D-NEPA) in D_2O (a) and NEPA in H_2O (b) and their 2nd derivatives.

(a)



(b)

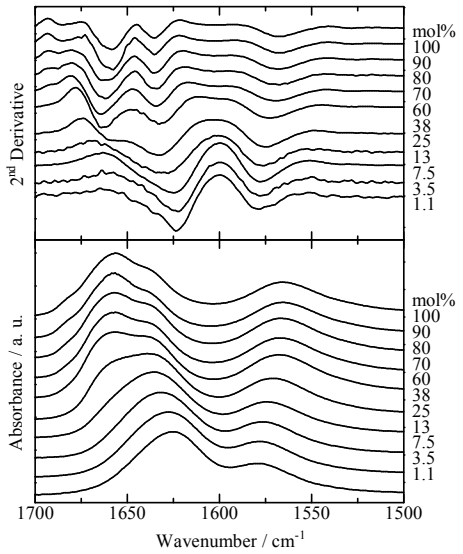


Figure F. IR spectra of various concentrations of deuterised *N*-methylacetamide (D-NMA) in D_2O (a) and NMA in H_2O (b) and their 2nd derivatives.

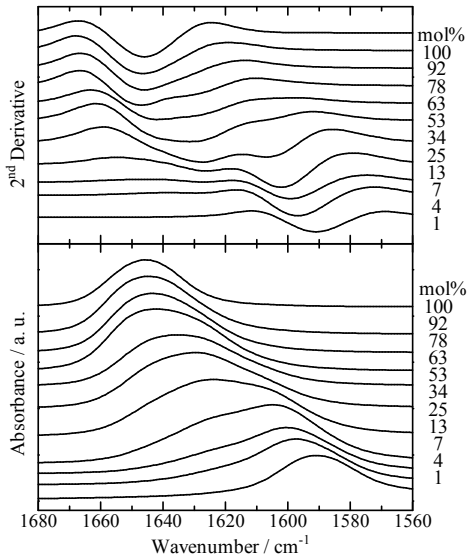


Figure G. IR spectra of various concentrations of *N*-ethyl-*N*-propylpropionamide (EnPP) in D_2O in the amide I region and their 2nd derivatives.

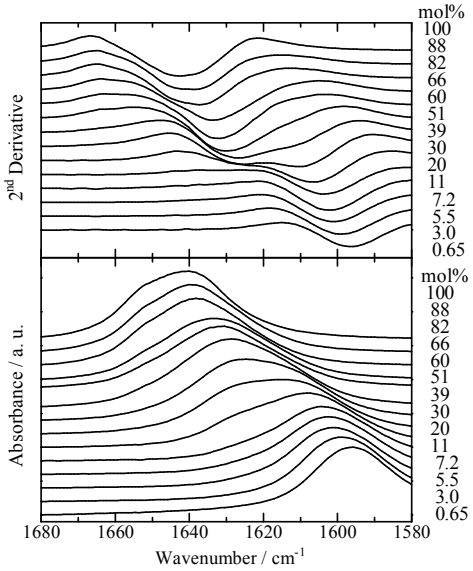


Figure H. IR spectra of various concentrations of *N,N*-diethylacetamide (dEA) in D_2O in the amide I region and their 2nd derivatives.

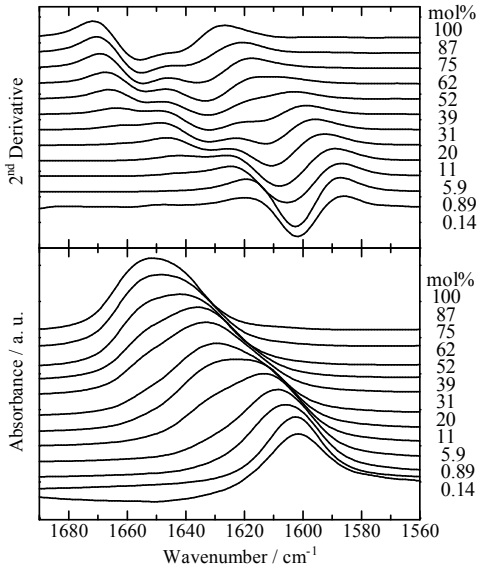


Figure I. IR spectra of various concentrations of *N,N*-dimethylpropionamide (dMP) in D_2O in the amide I region and their 2nd derivatives.

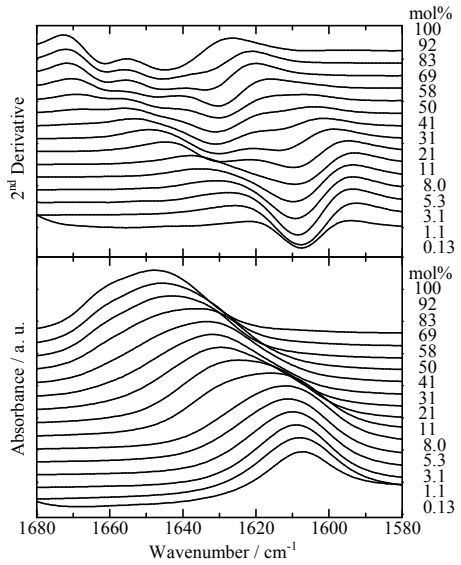


Figure J. IR spectra of various concentrations of *N,N*-dimethylacetamide (dMA) in D_2O in the amide I region and their 2nd derivatives.

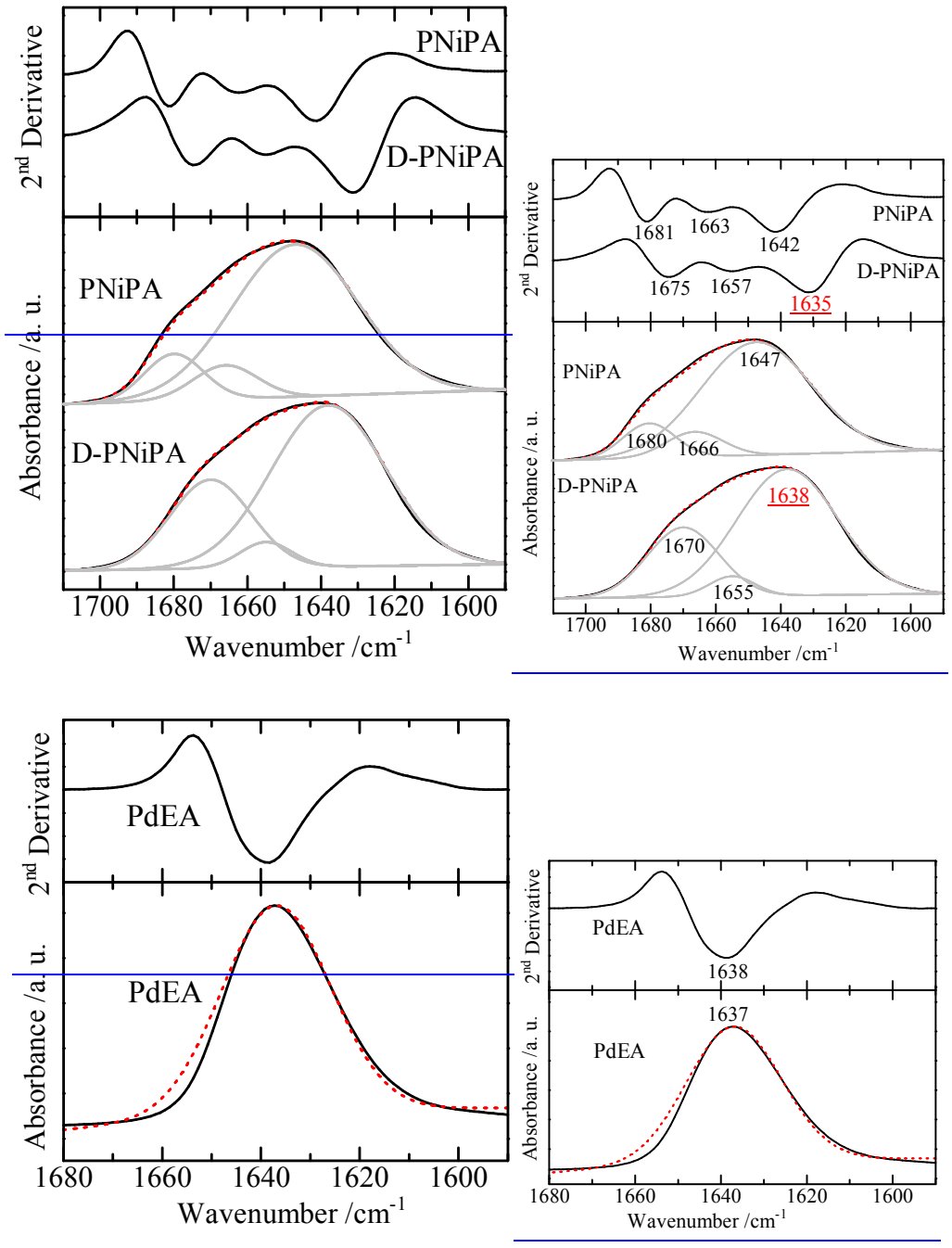
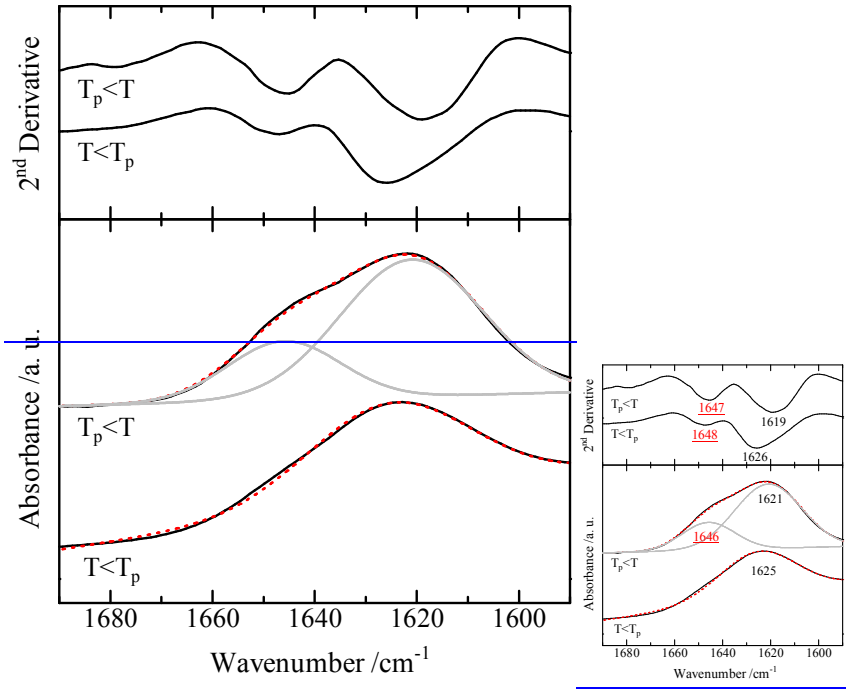


Figure K. IR spectra of (D-)PNiPA and PdEA films in the amide I band region and their 2nd derivatives. The dotted line is a sum of three Gaussian components of gray lines for (D-)PNiPA and one Gaussian component for

PdEA. The peak-positions of three Gaussian components of (D-)PNiPA film are 1680, 1666 and 1647 cm^{-1} (1670, 1655 and 1638 cm^{-1}). The peak-position of a single Gaussian component of PdEA is ~~1636~~ 1637 cm^{-1}.

(a)



(b)

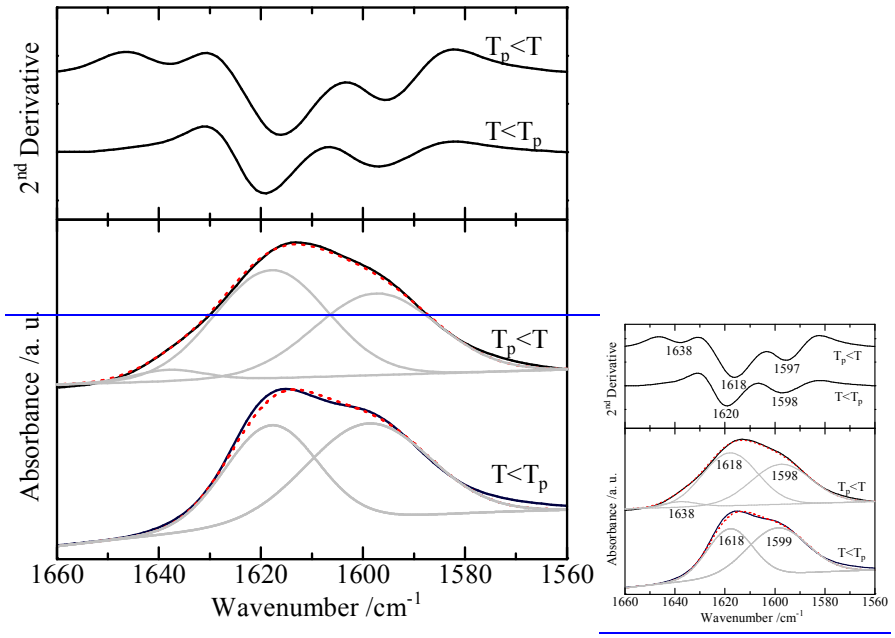


Figure L. IR spectra of (a) 0.09 mol% D-PNiPA and (b) 0.74 mol% PdEA in D_2O below and above the phase transition temperature (T_p) in the amide I band region and their 2nd derivatives. The dotted line is a sum of Gaussian components of gray lines. The area portions of Gaussian components of D-PNiPA are estimated as 100% (~~1621~~ 1625 cm^{-1}) at 31.6ºC, and 57% (1646 cm^{-1}) and 43% (1621 cm^{-1}) at 34.5ºC. The area portion of PdEA are 43% (1599 cm^{-1}) and 57% (1618 cm^{-1}) at 26.0ºC, and 44%(1598 cm^{-1}), 53%(1618 cm^{-1}) and 3%(1638 cm^{-1}) at 39.9ºC.