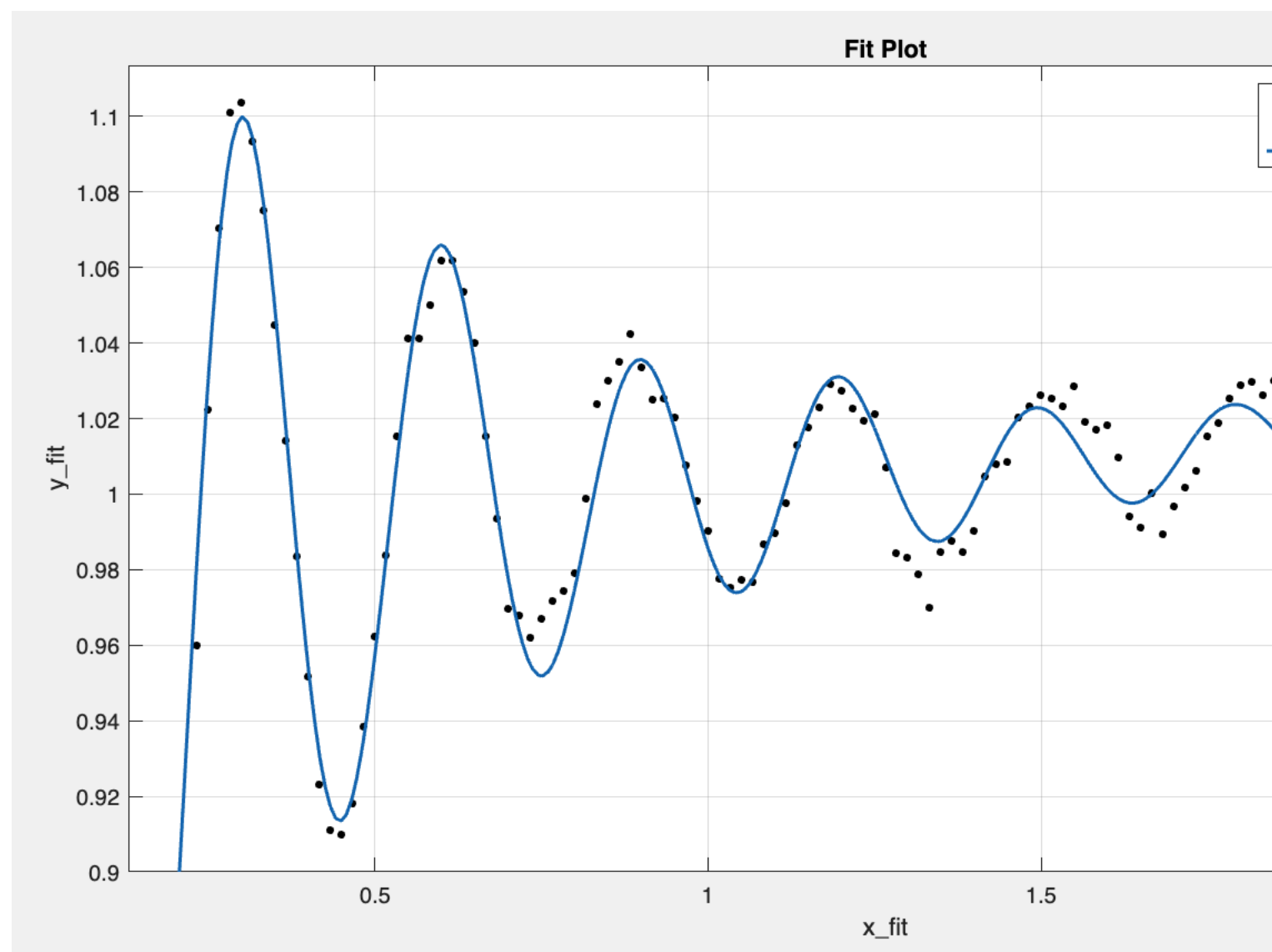


ET_hBN

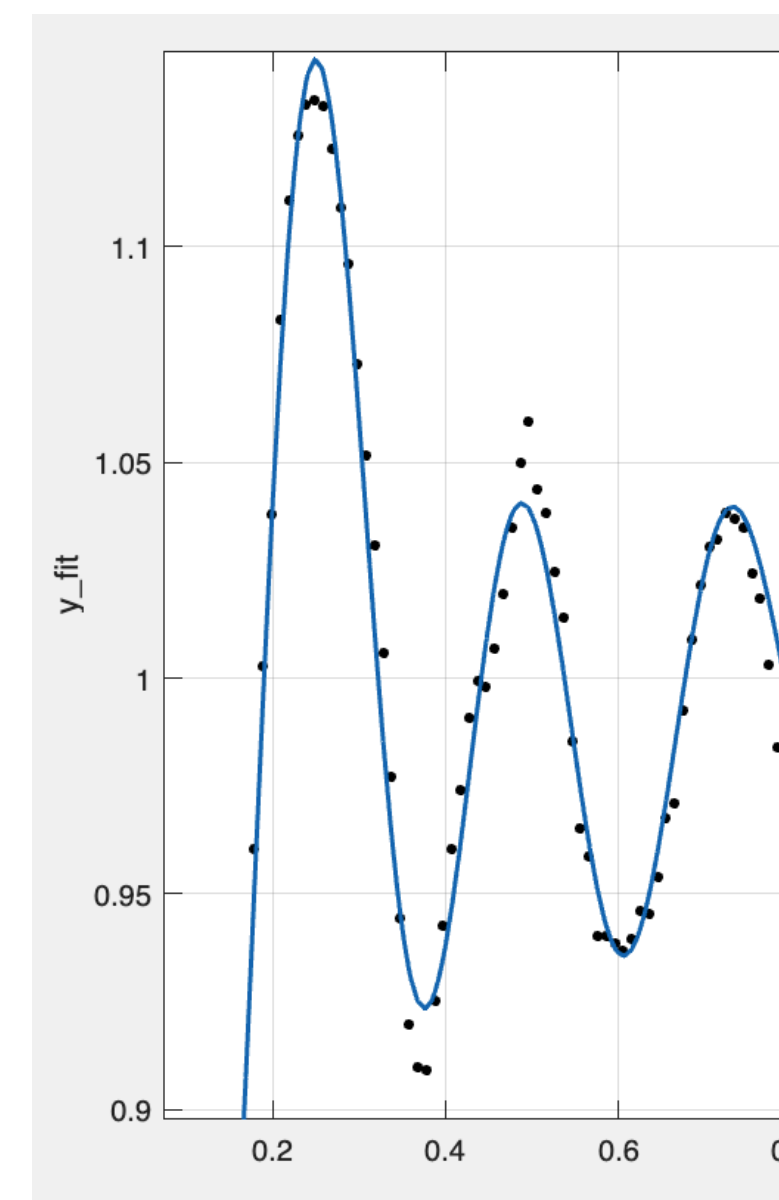
Junhe Zhang, May 2023

Curve fitting to extract λ_p and L_p

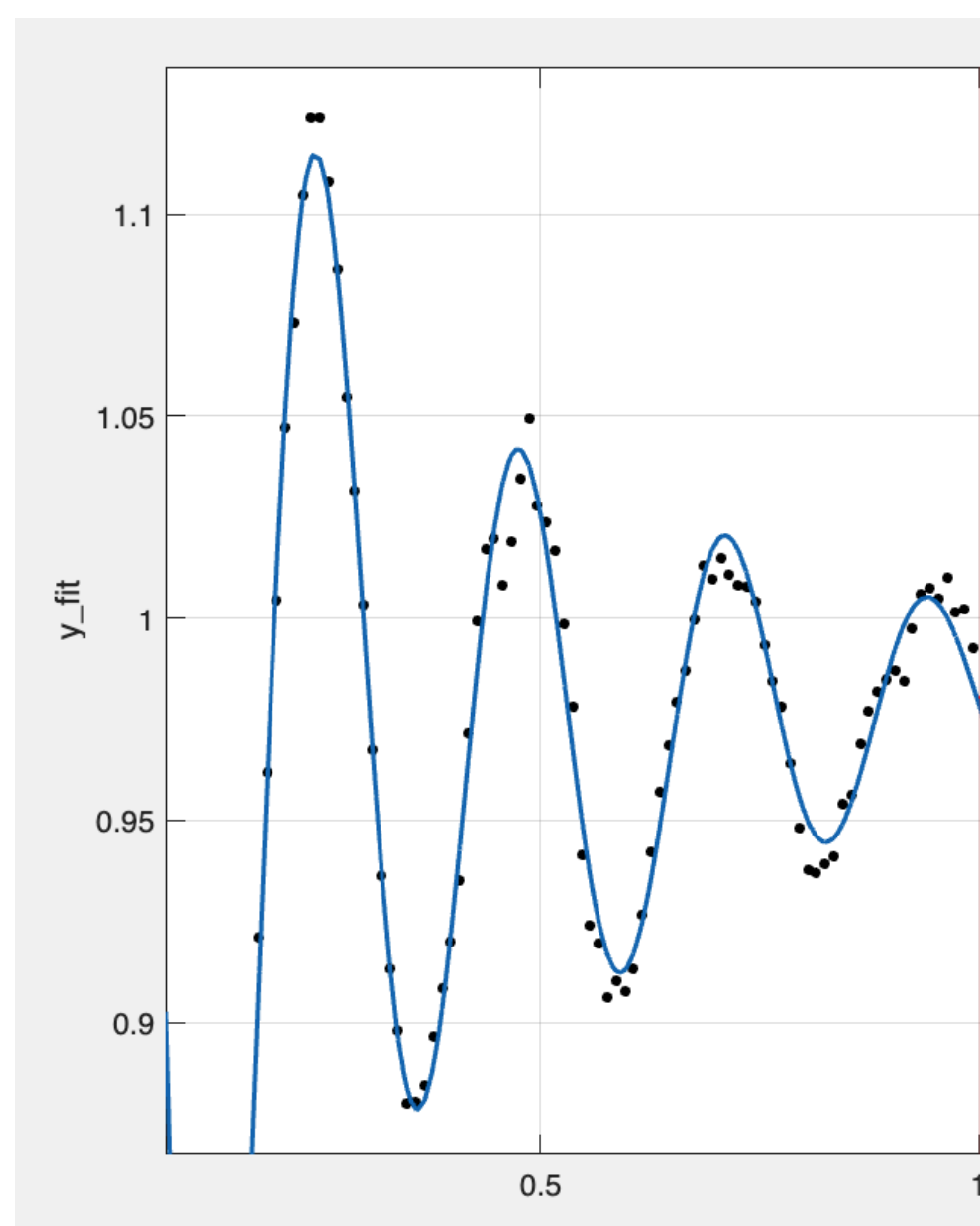
$$\xi_{opt}(x) = \xi_0 + A \frac{e^{-\frac{2x}{L_p} \sin\left(4\pi \frac{x-x_A}{\lambda_p}\right)}}{\sqrt{x}} + B \frac{e^{-\frac{x}{L_p} \sin\left(2\pi \frac{x-x_B}{\lambda_p}\right)}}{x^a}, \quad A, B, L_p, \lambda_p, a > 0, \quad (\text{S3})$$



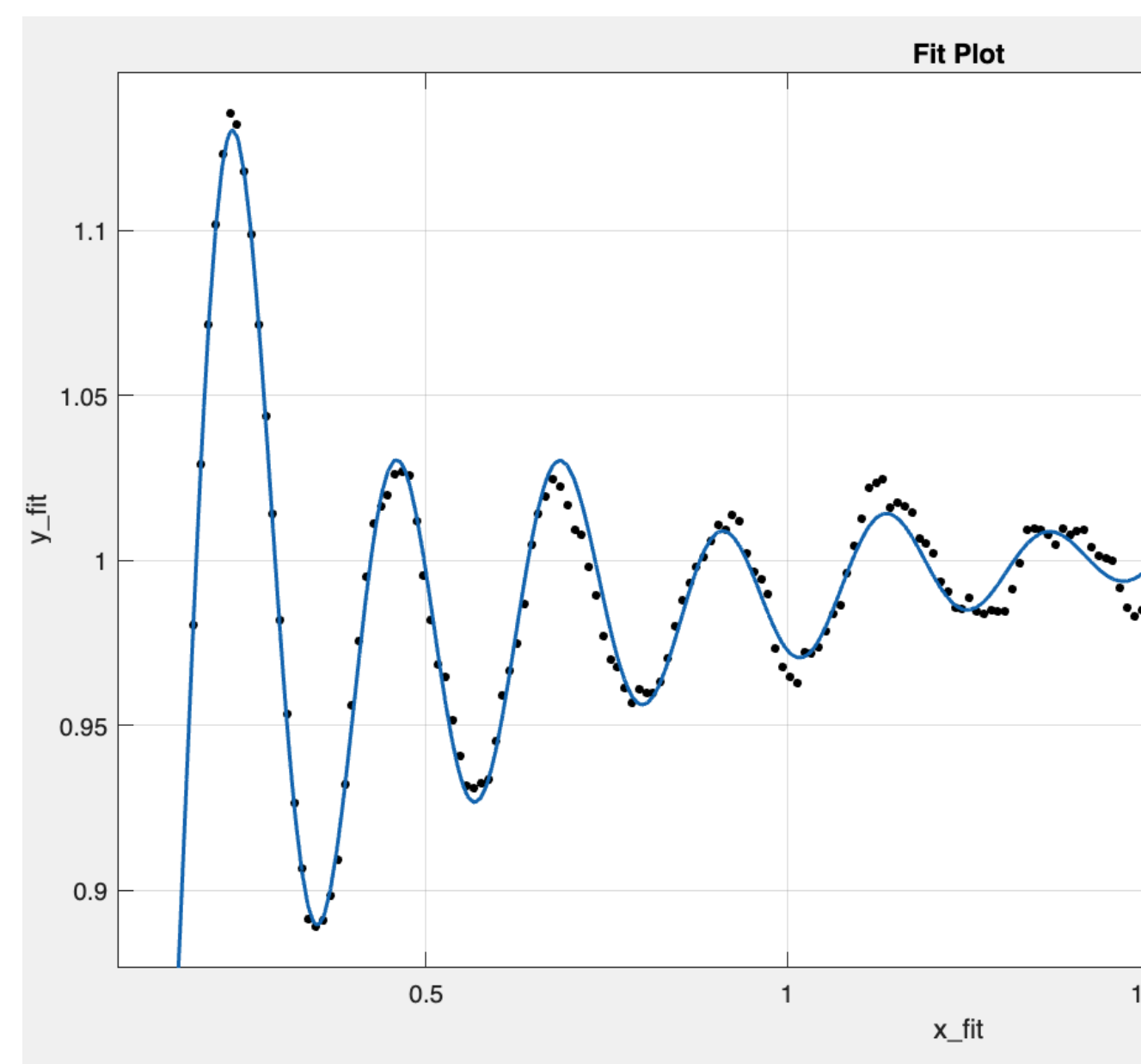
1450 cm-1
Lp: 1.9425 μm
W: 0.5945 μm



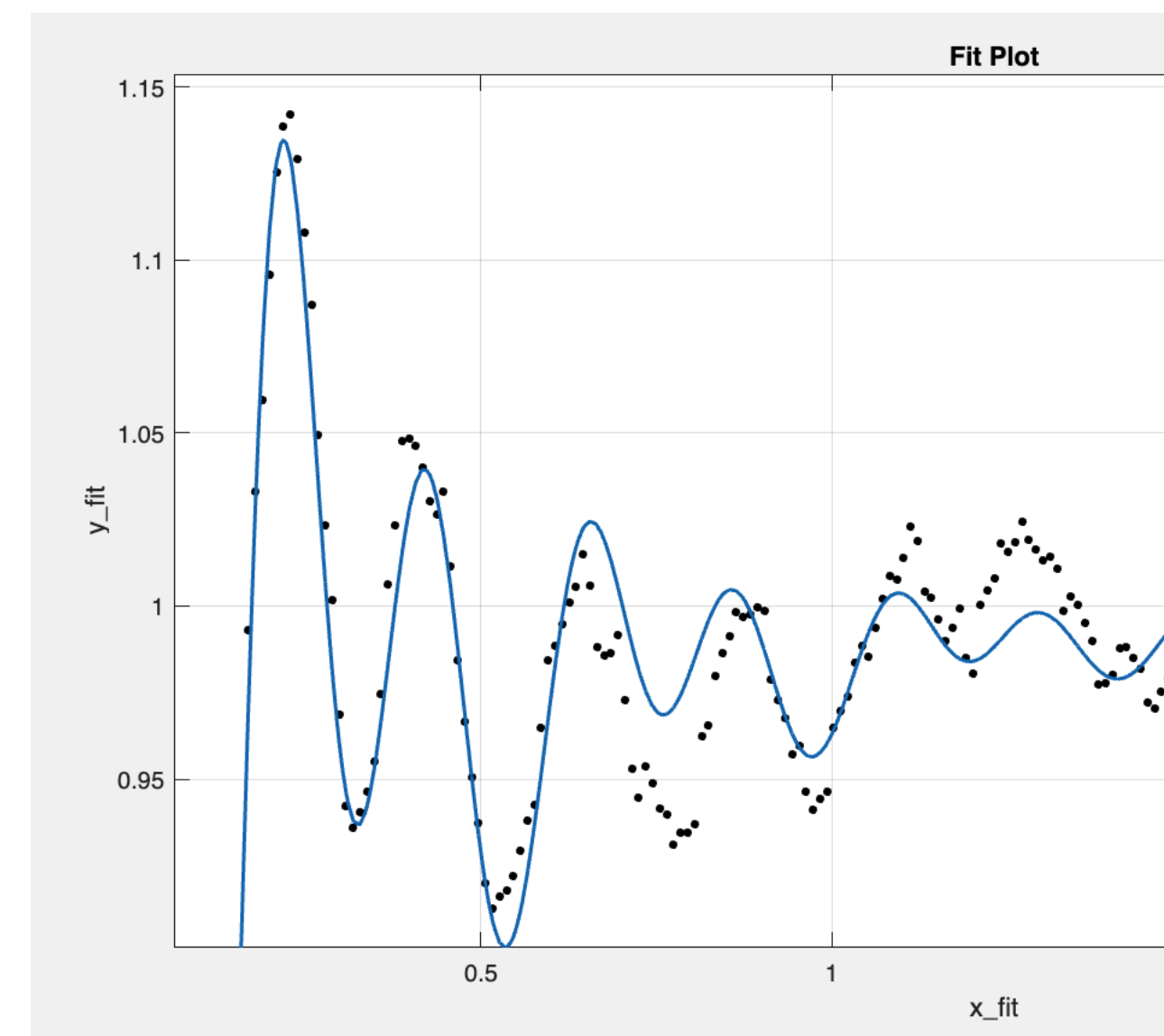
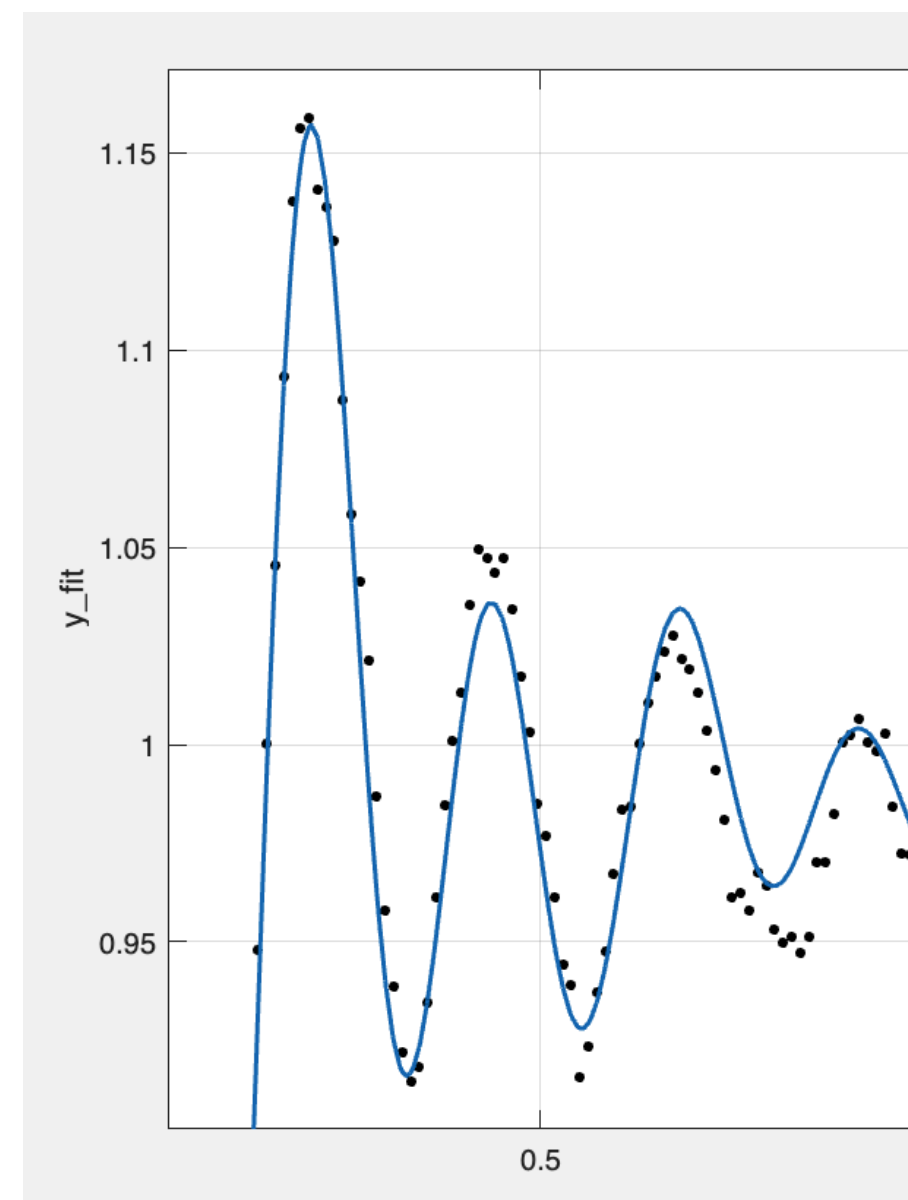
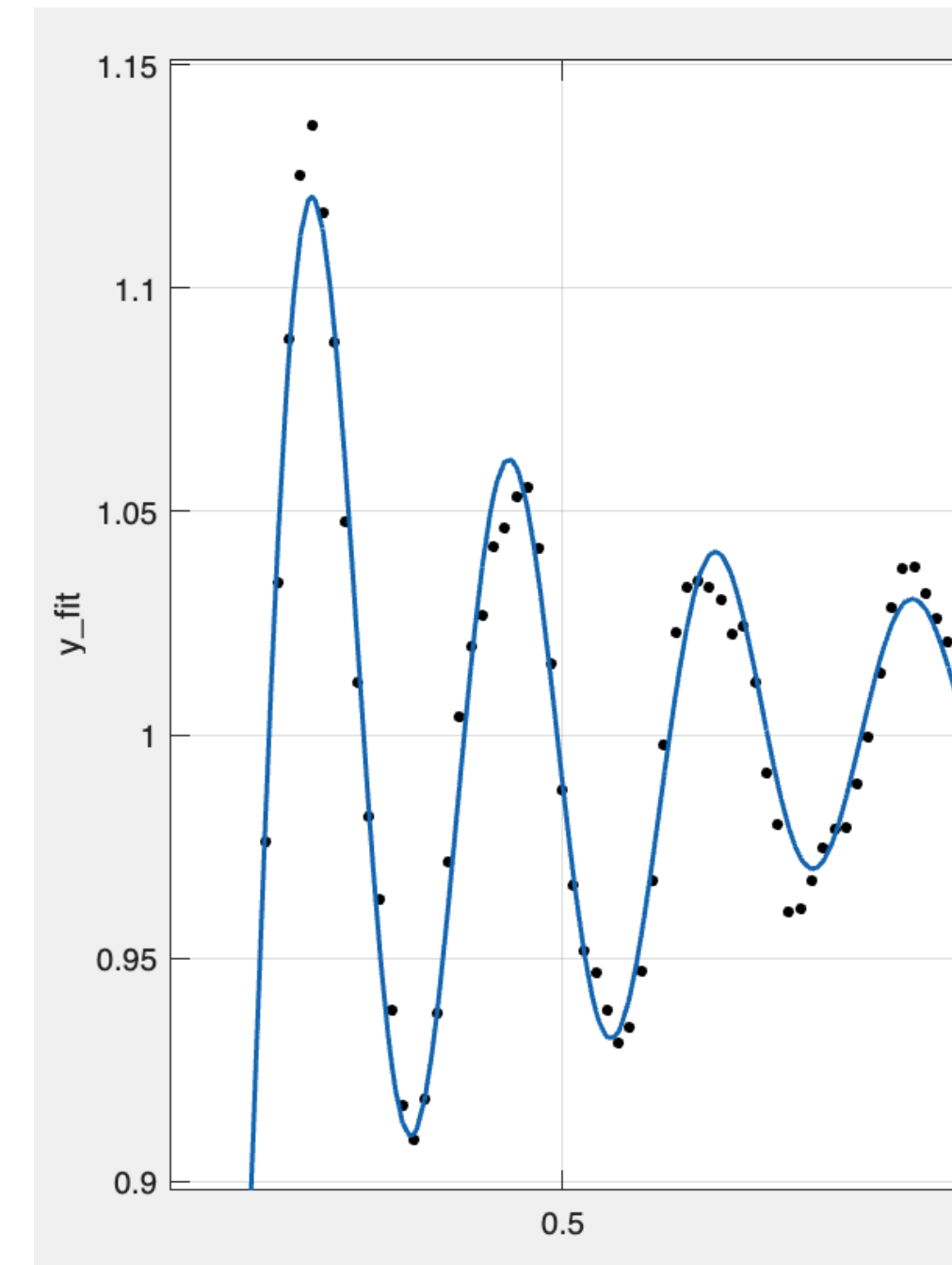
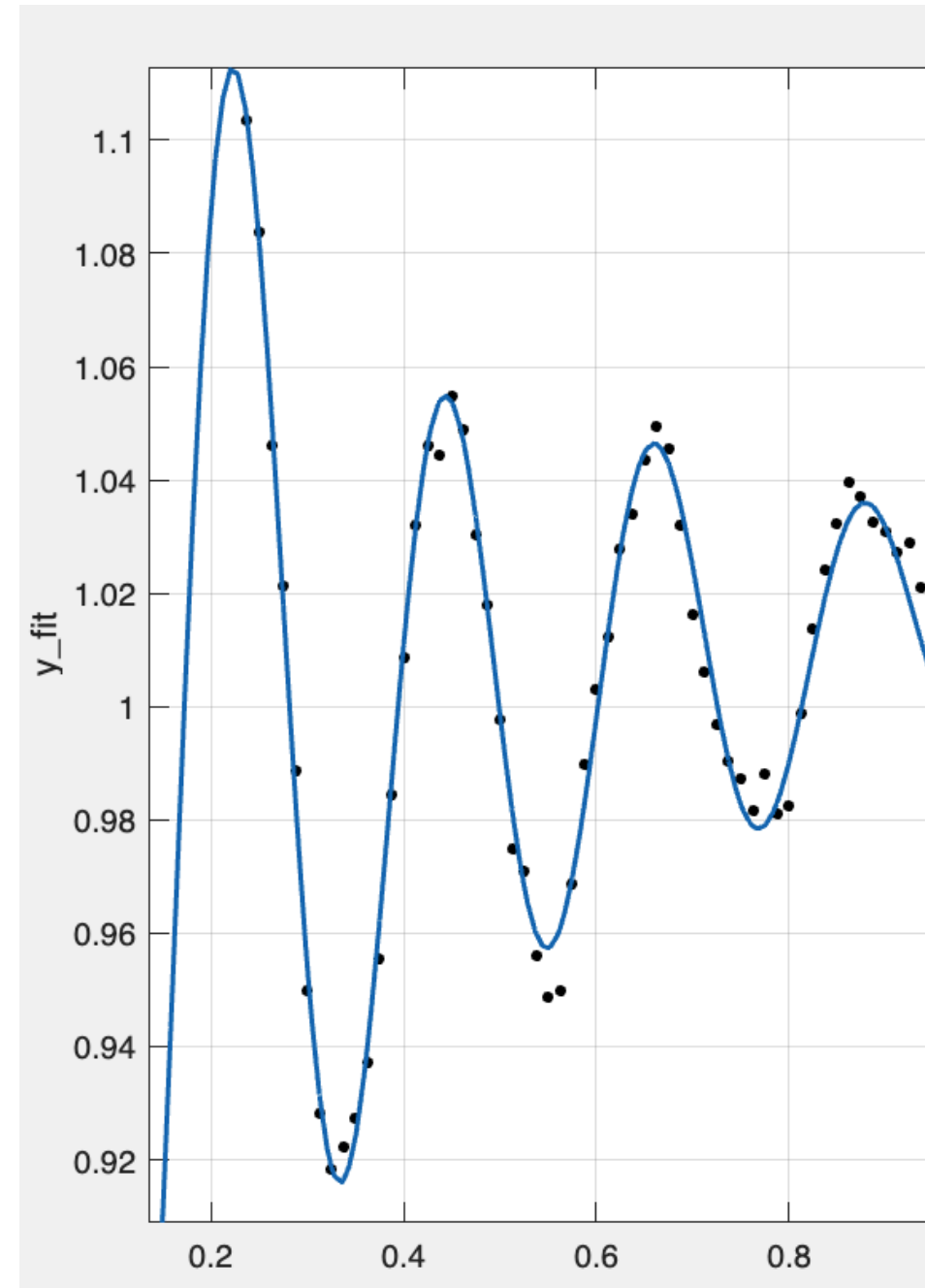
1461 cm-1
Lp: 1.8887 μm
W: 0.4809 μm

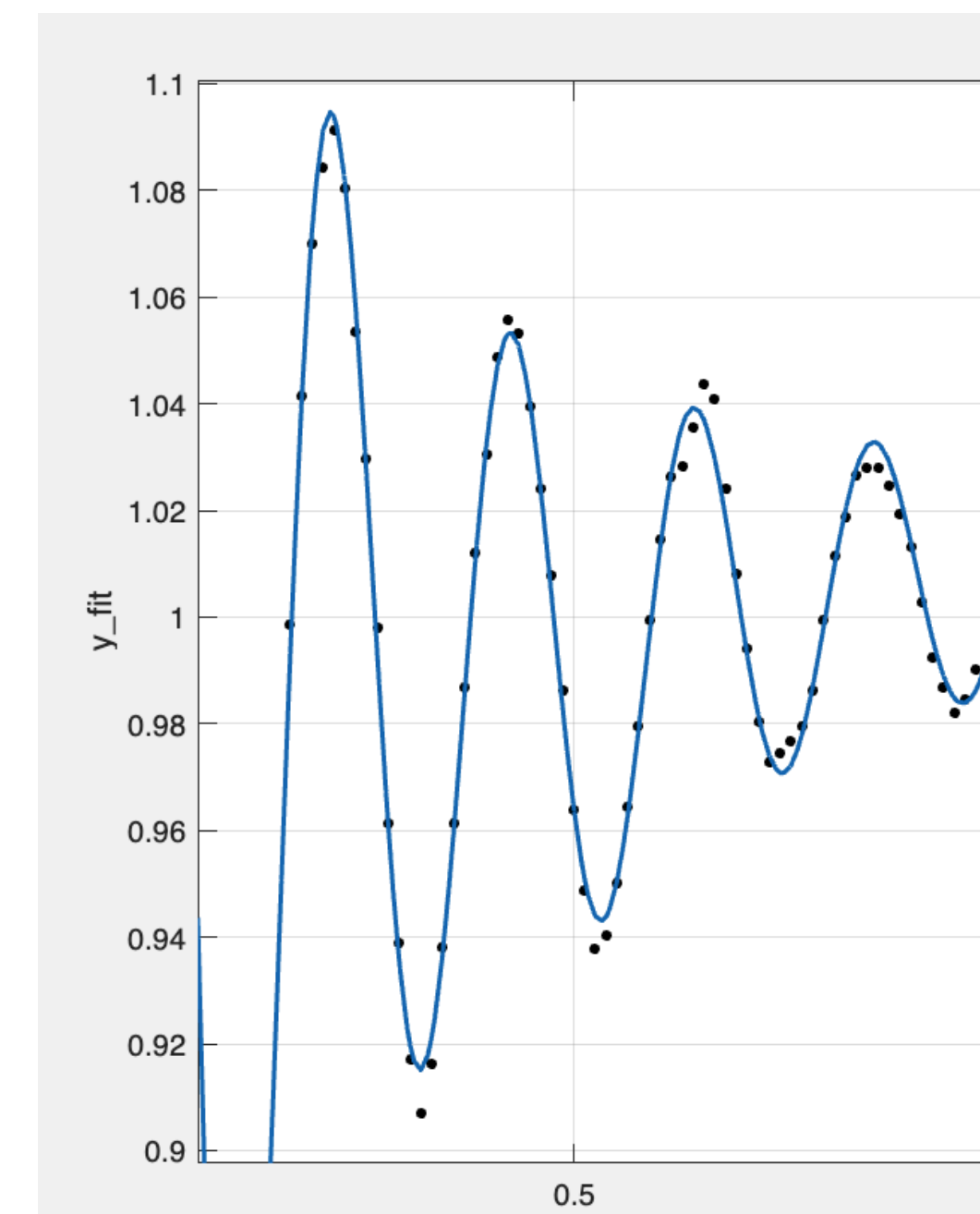
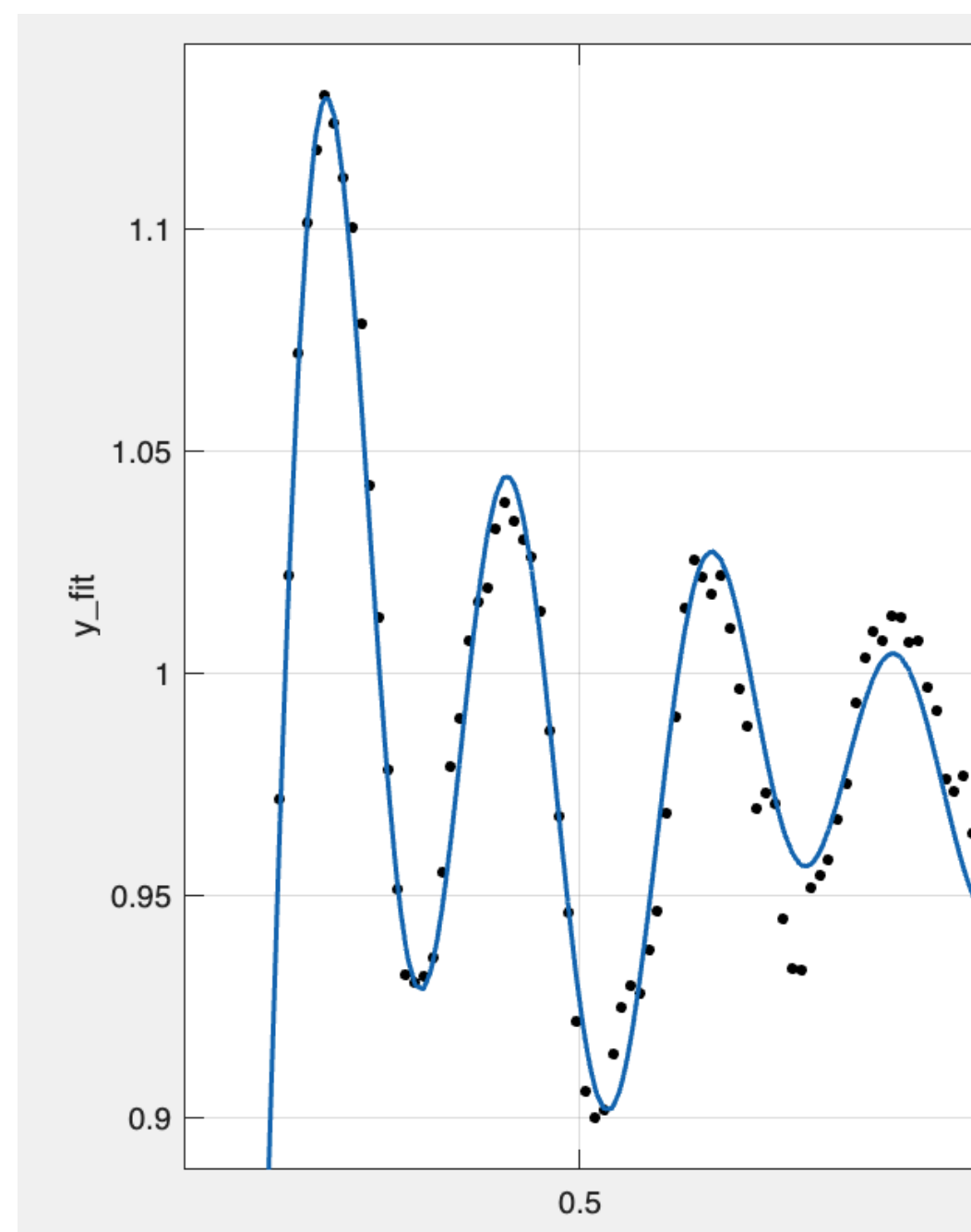
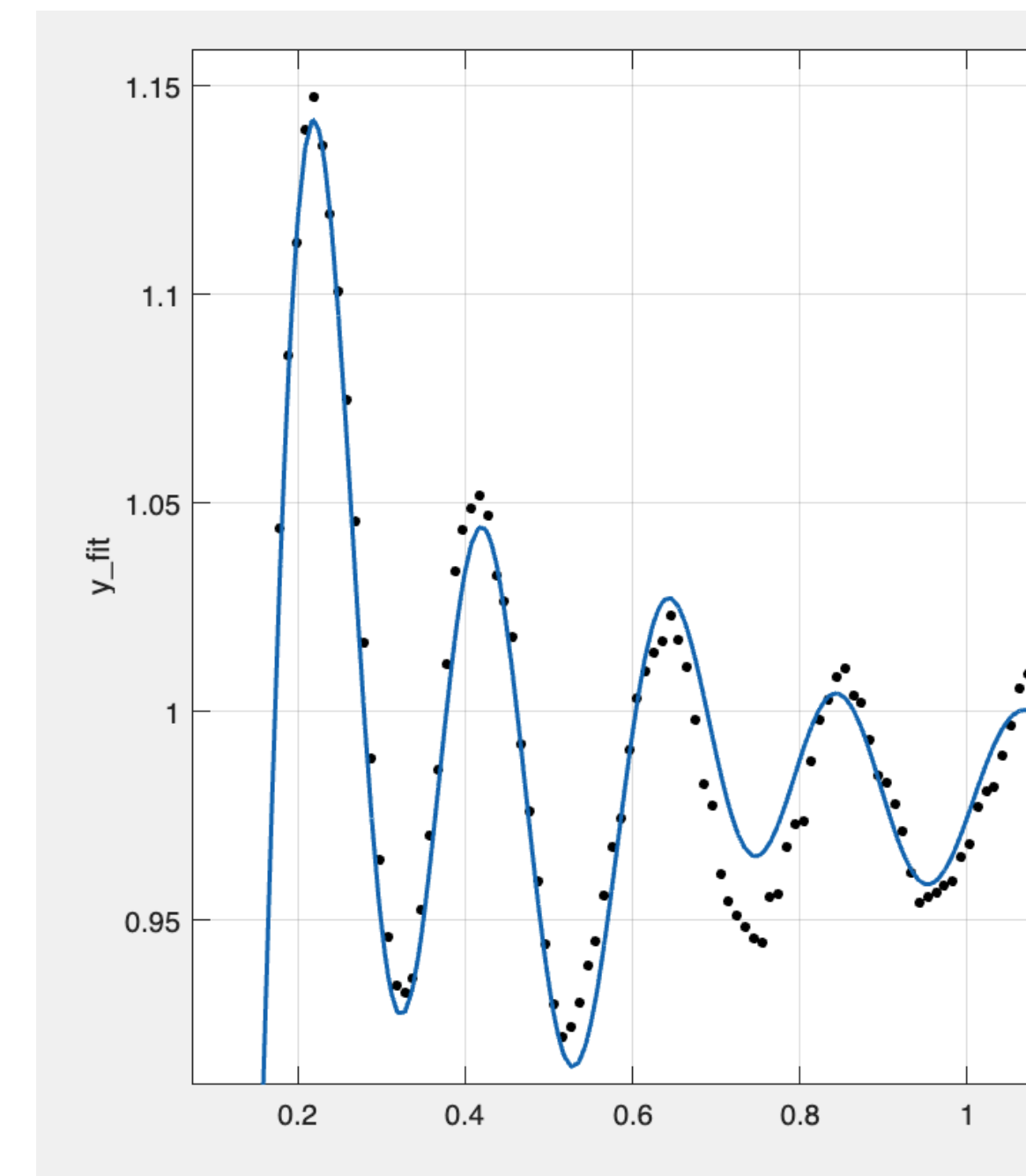
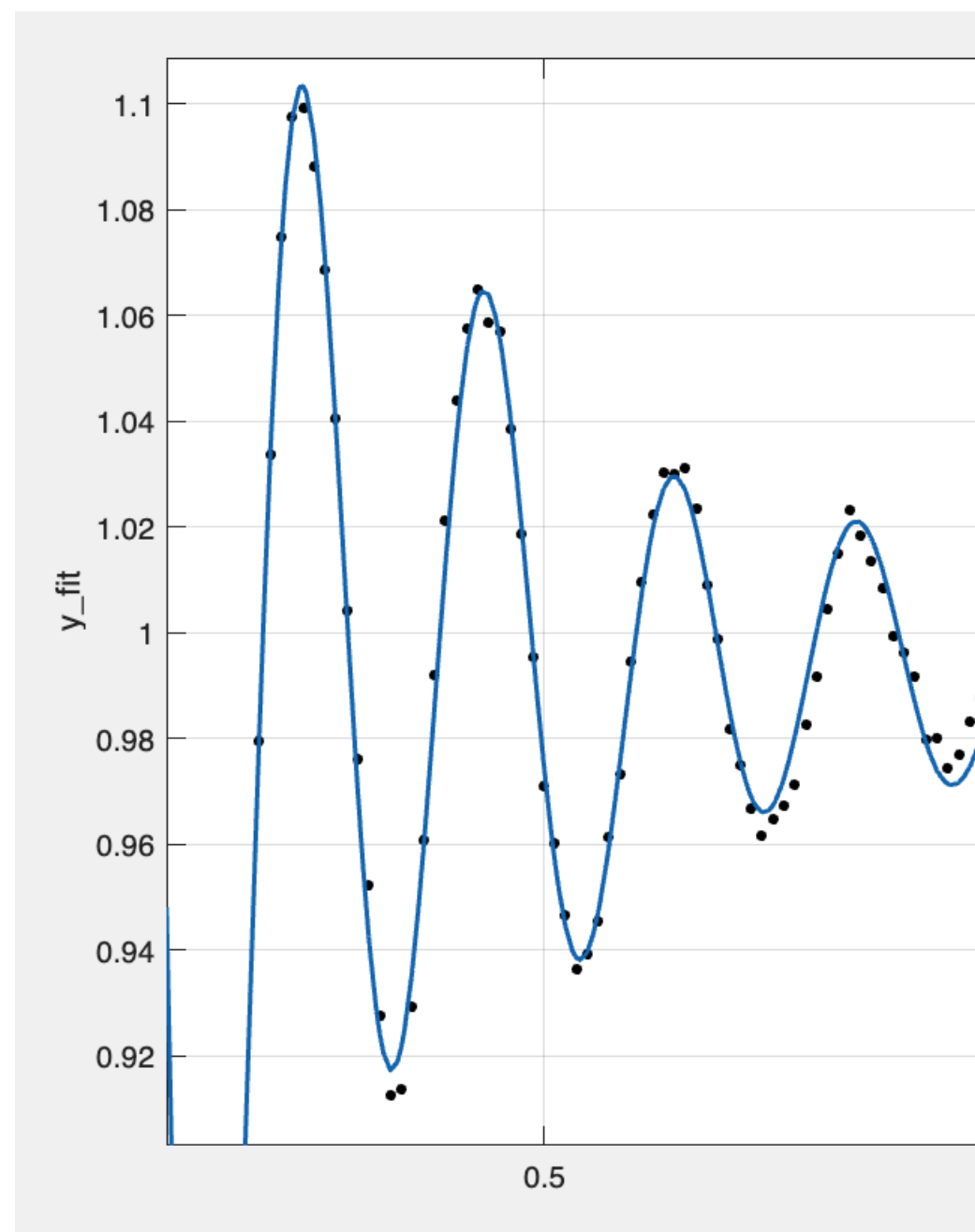


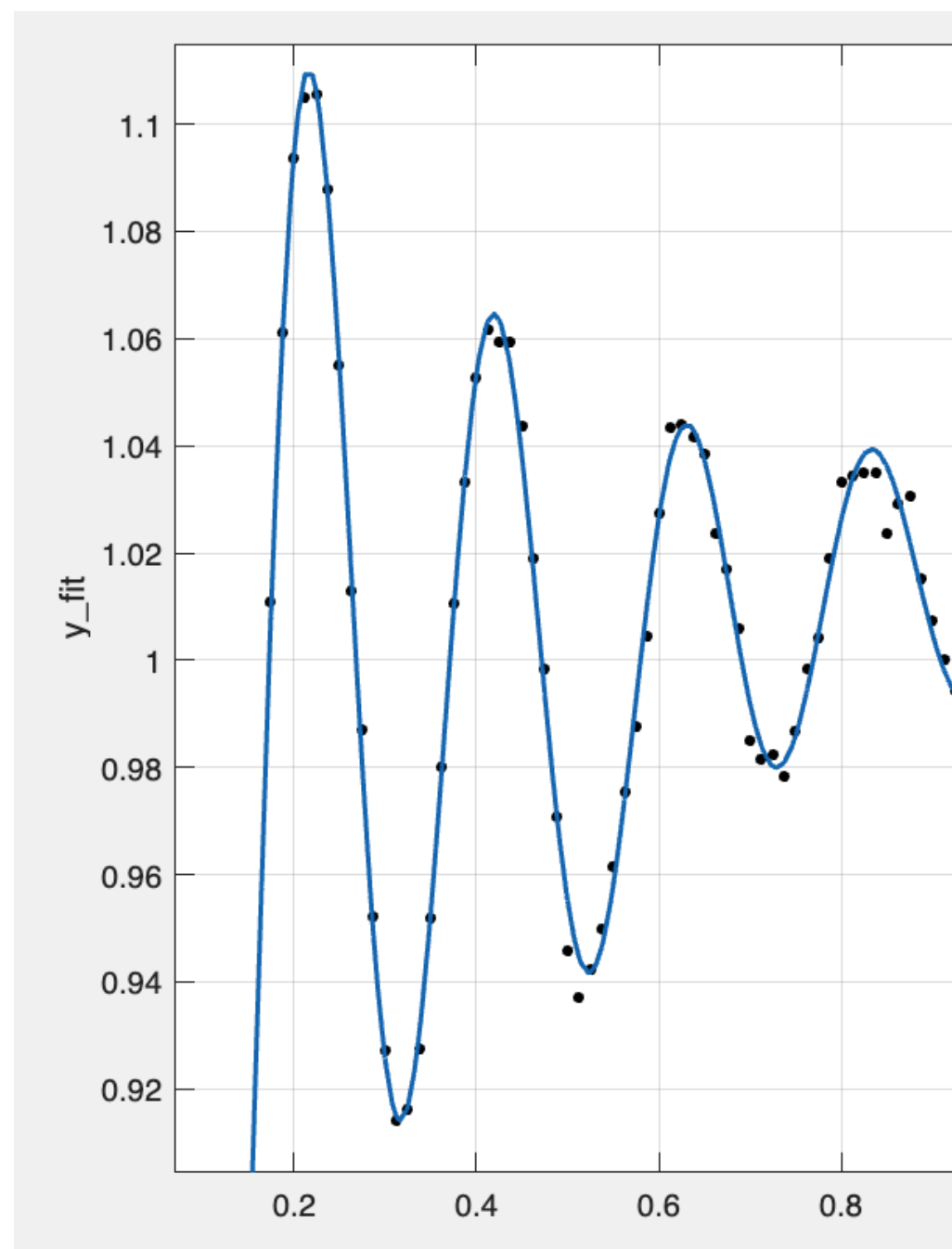
1463 cm-1
Lp: 1.4715 μm
W: 0.4652 μm



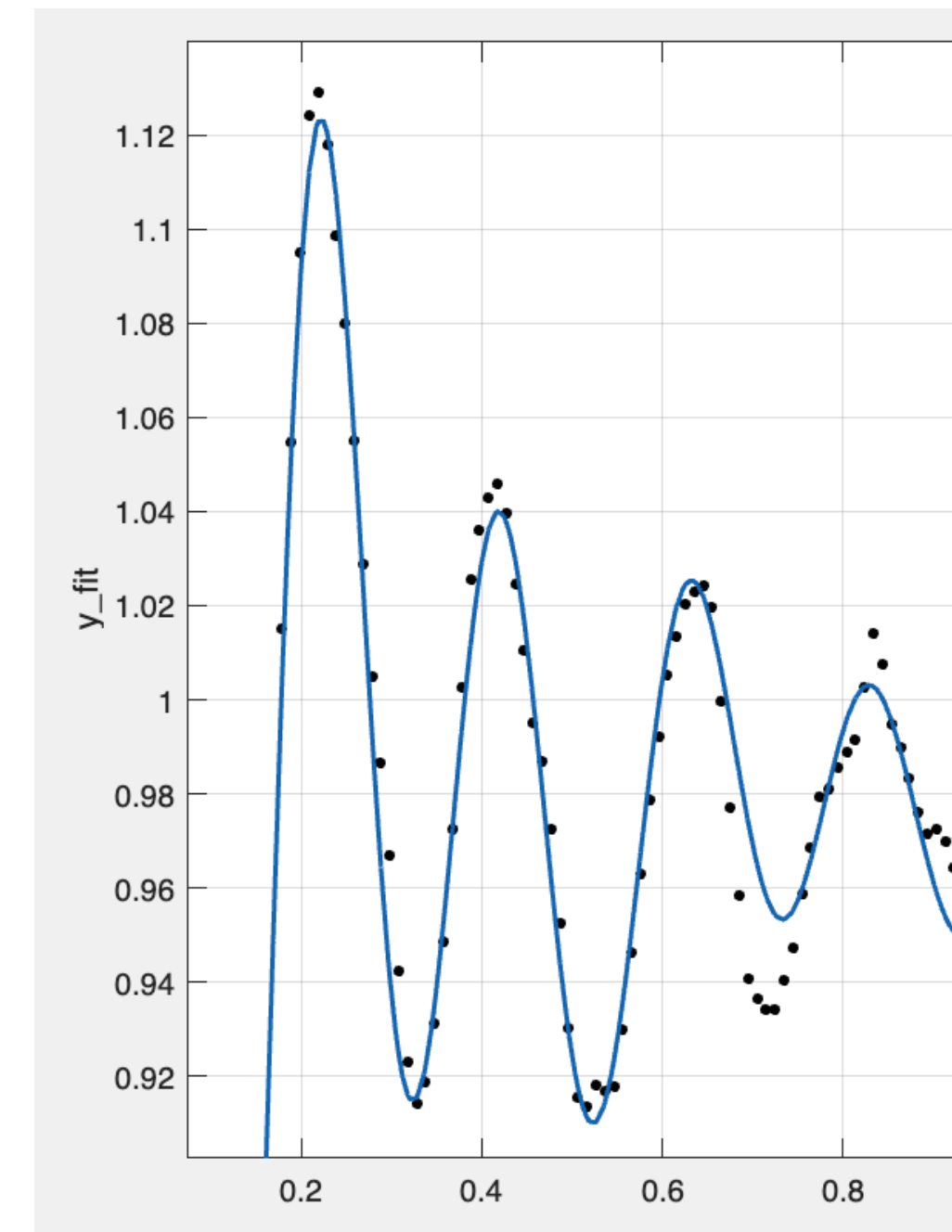
1465 cm-1
Lp: 1.4112 μm
W: 0.4504 μm



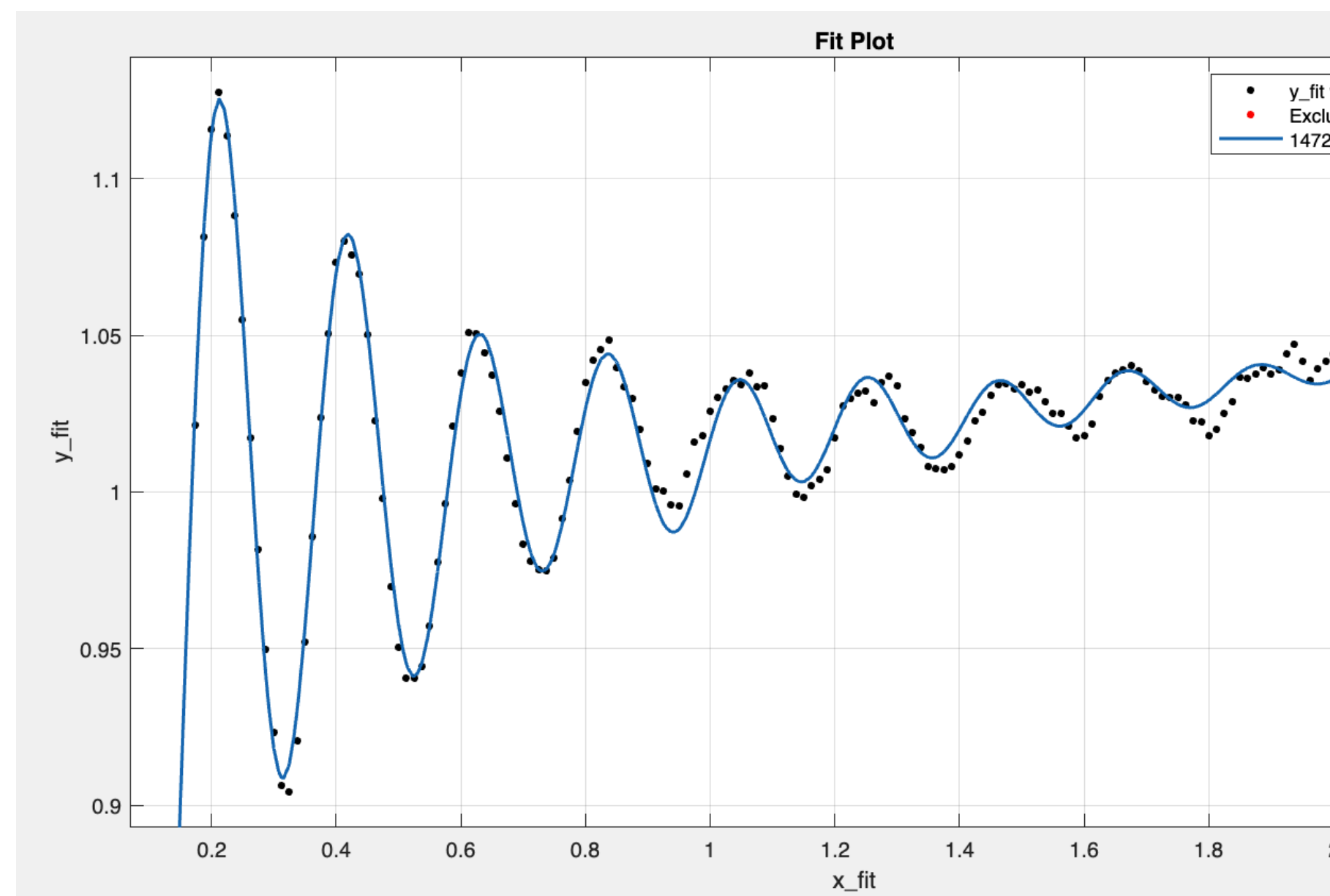




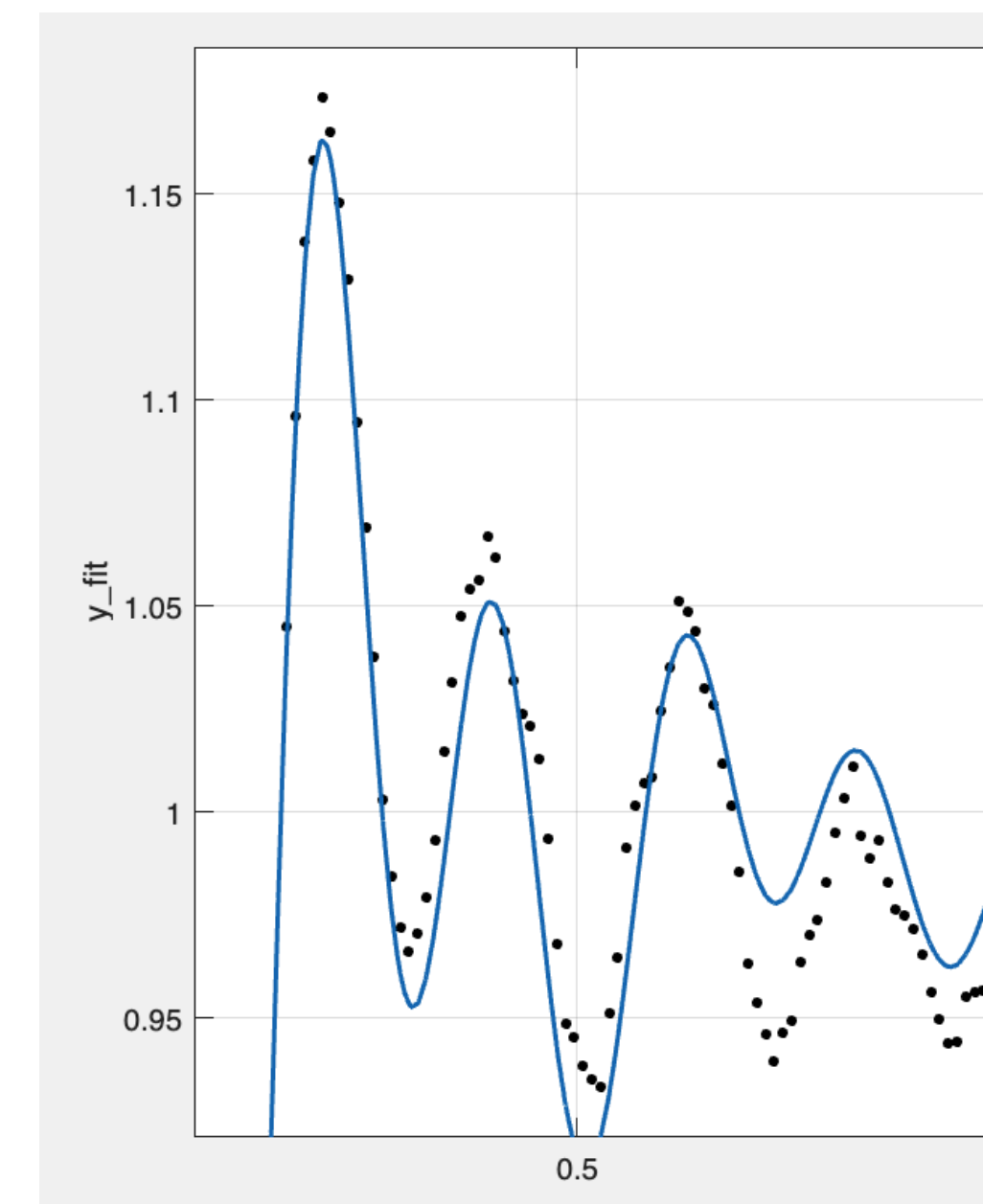
1471 cm^{-1}
 Lp: 1.3696 μm
 W: 0.4124 μm



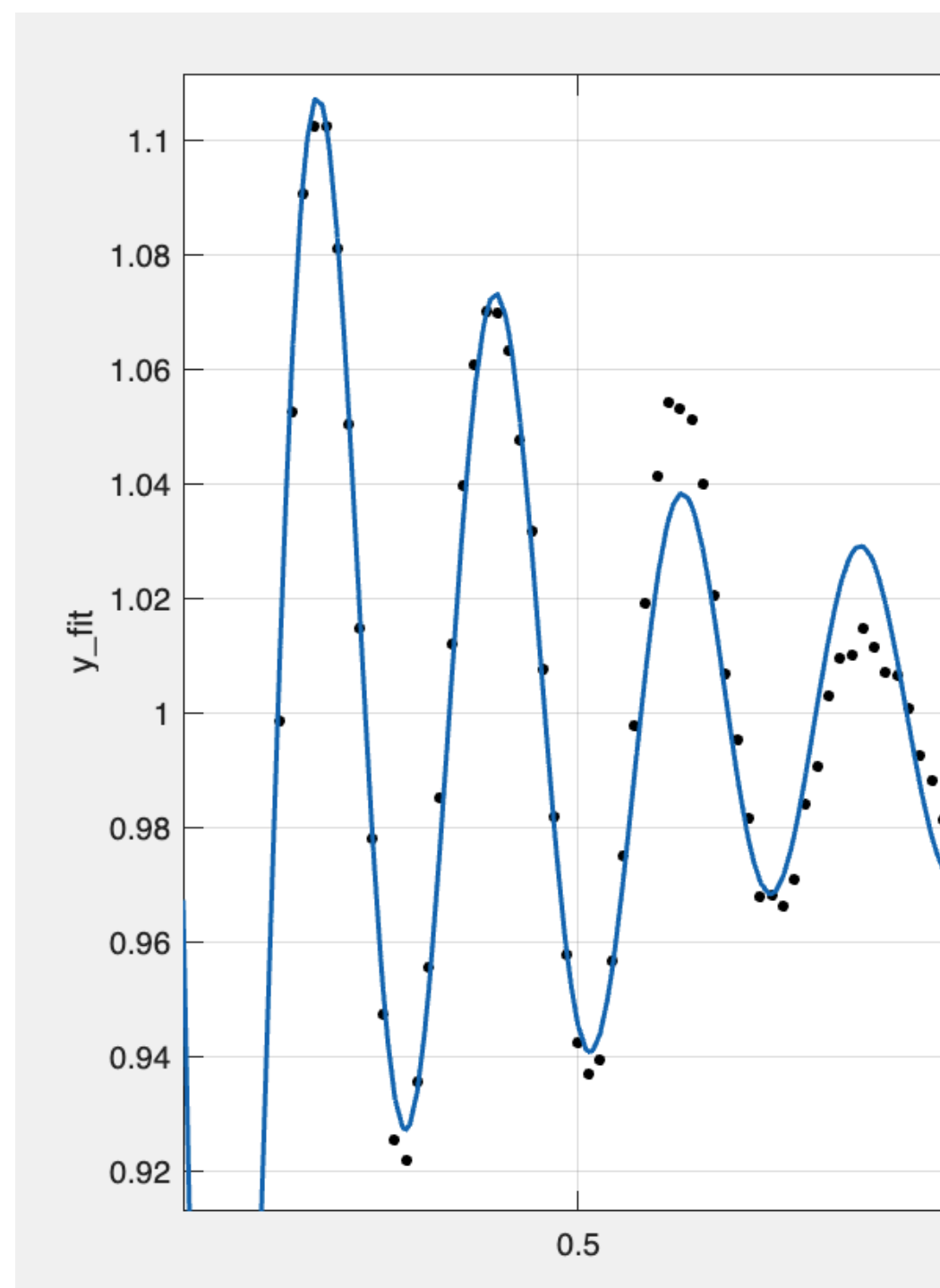
1471.5 cm^{-1}
 Lp: 1.4276 μm
 W: 0.4097 μm



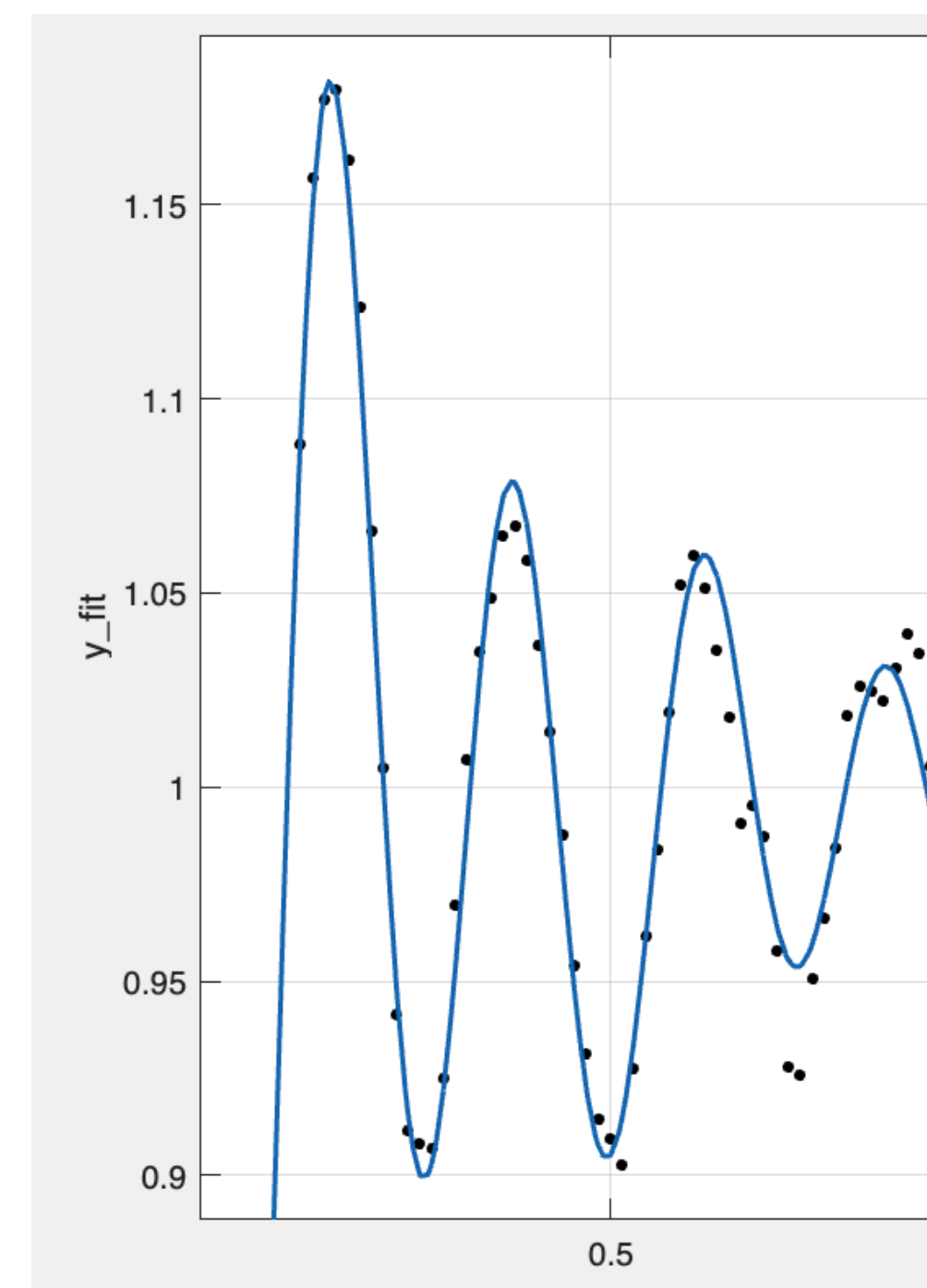
1472 cm^{-1}
 Lp: 1.4892 μm
 W: 0.4160 μm



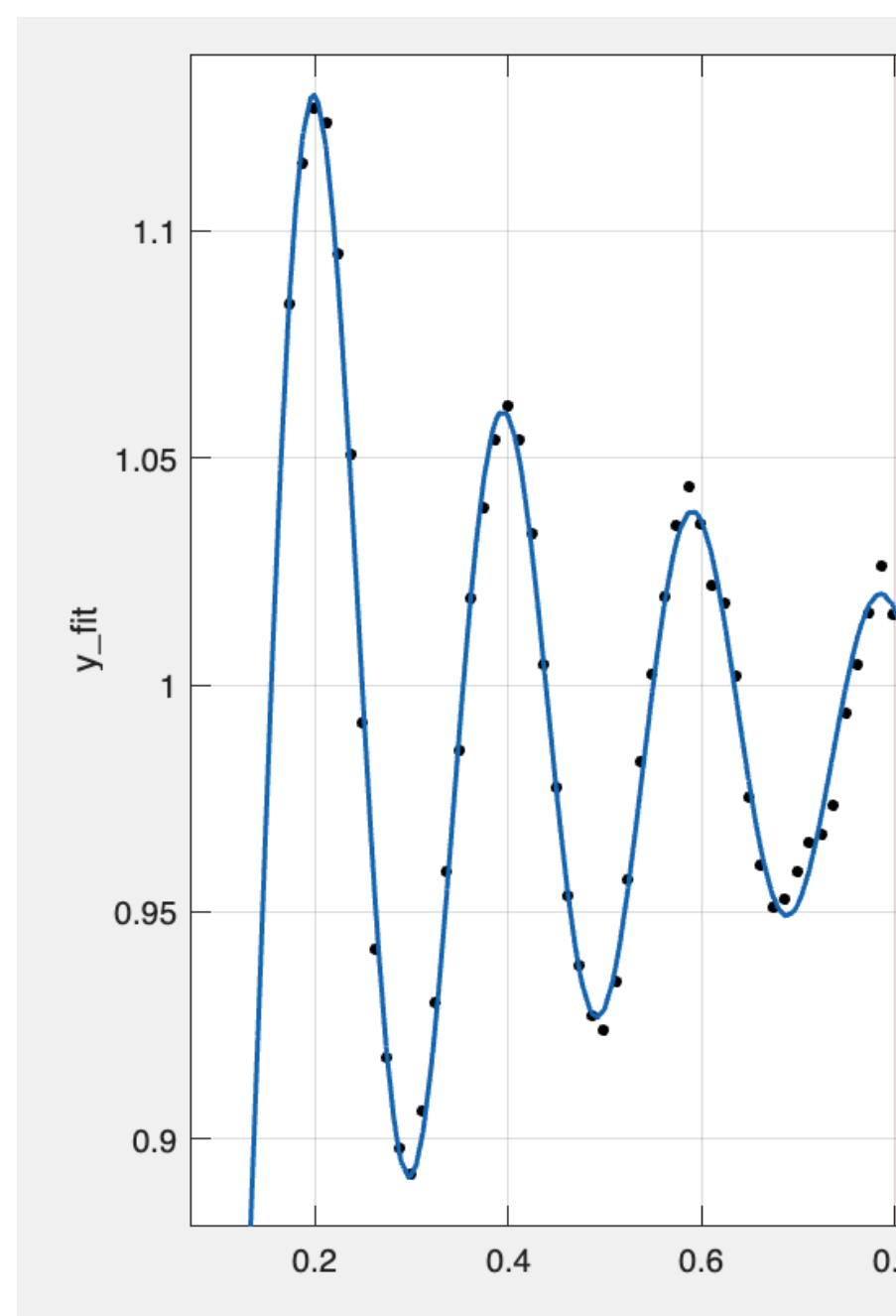
1472.5 cm^{-1}
 Lp: 1.2918 μm
 W: 0.4153 μm



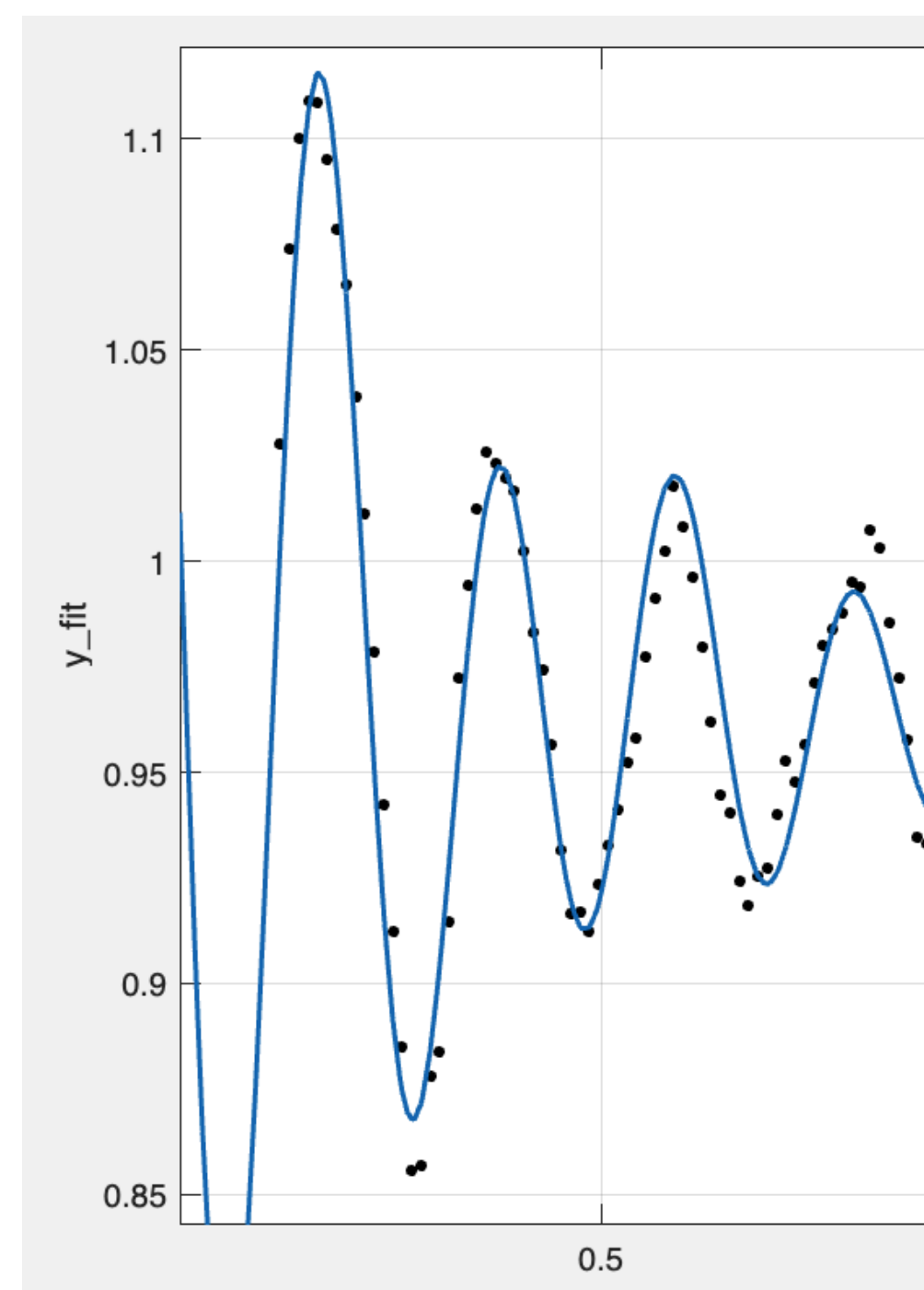
1473.5 cm⁻¹
Lp: 1.5801 μ m
W: 0.3978 μ m



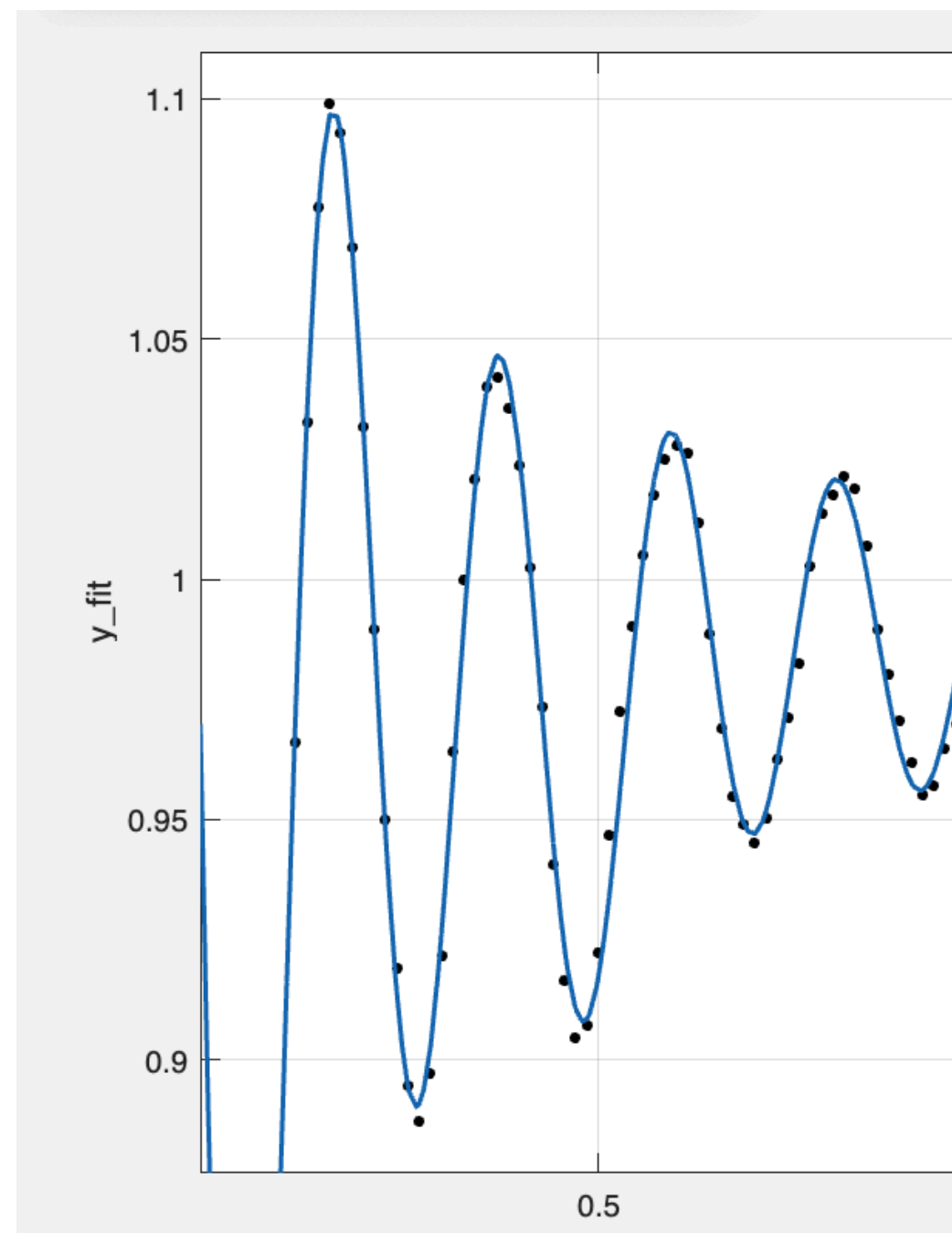
1475 cm⁻¹
Lp: 1.6097 μ m
W: 0.3912 μ m



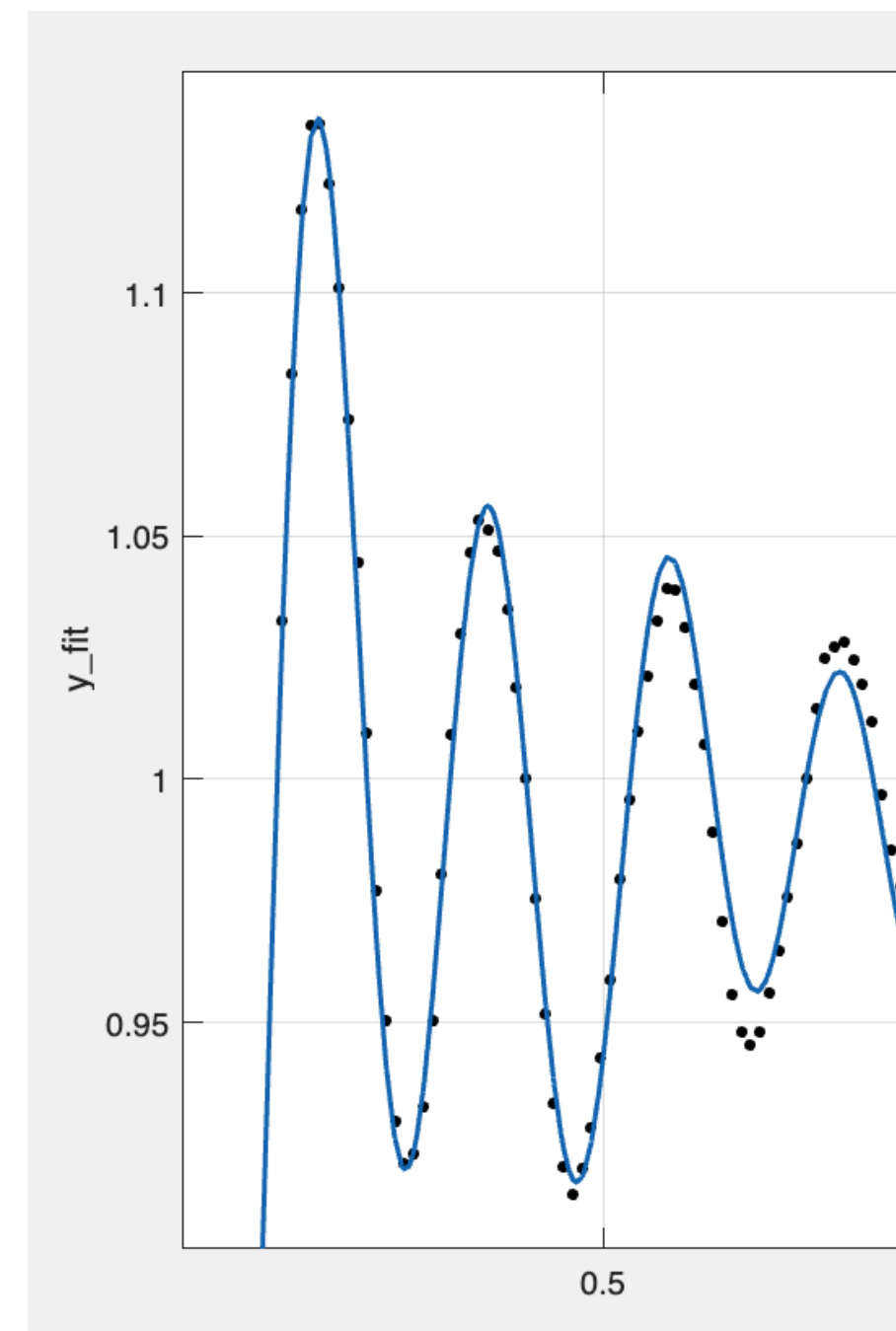
1476 cm⁻¹
Lp: 1.6046 μ m
W: 0.3901 μ m



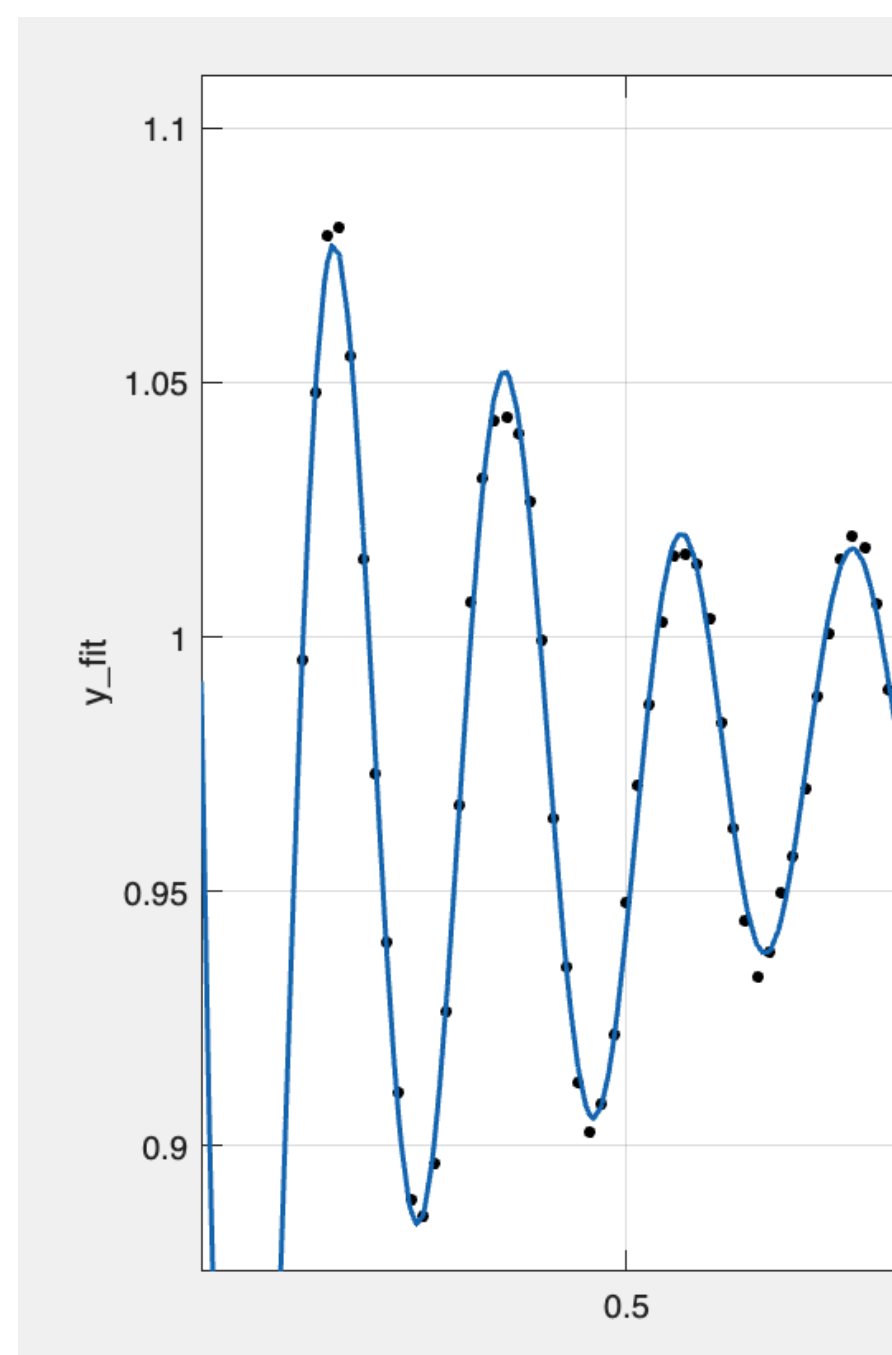
1477 cm⁻¹
Lp: 1.7596 μ m
W: 0.3751 μ m



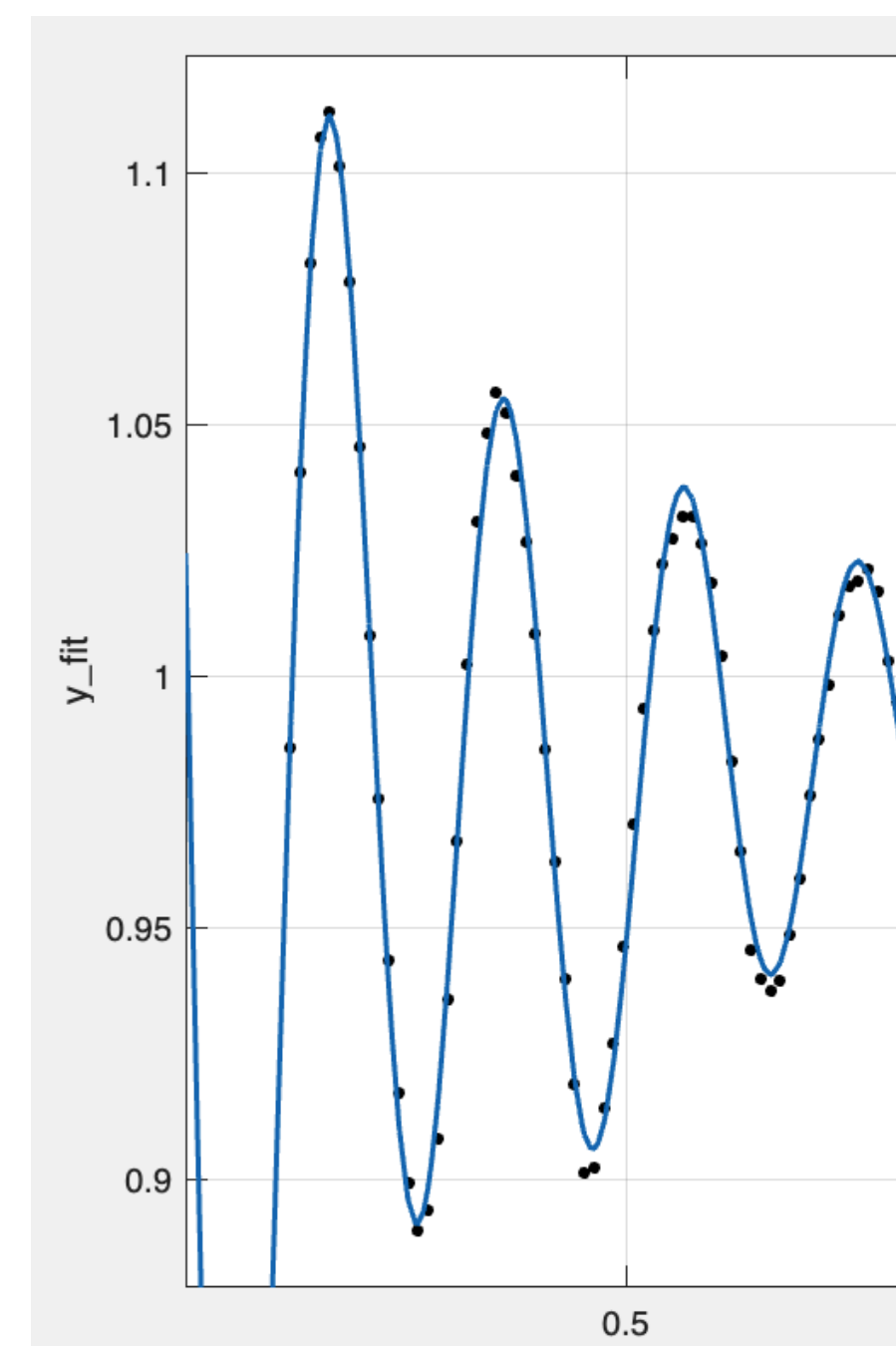
1478 cm-1
Lp: 1.8028 μm
W: 0.3755 μm



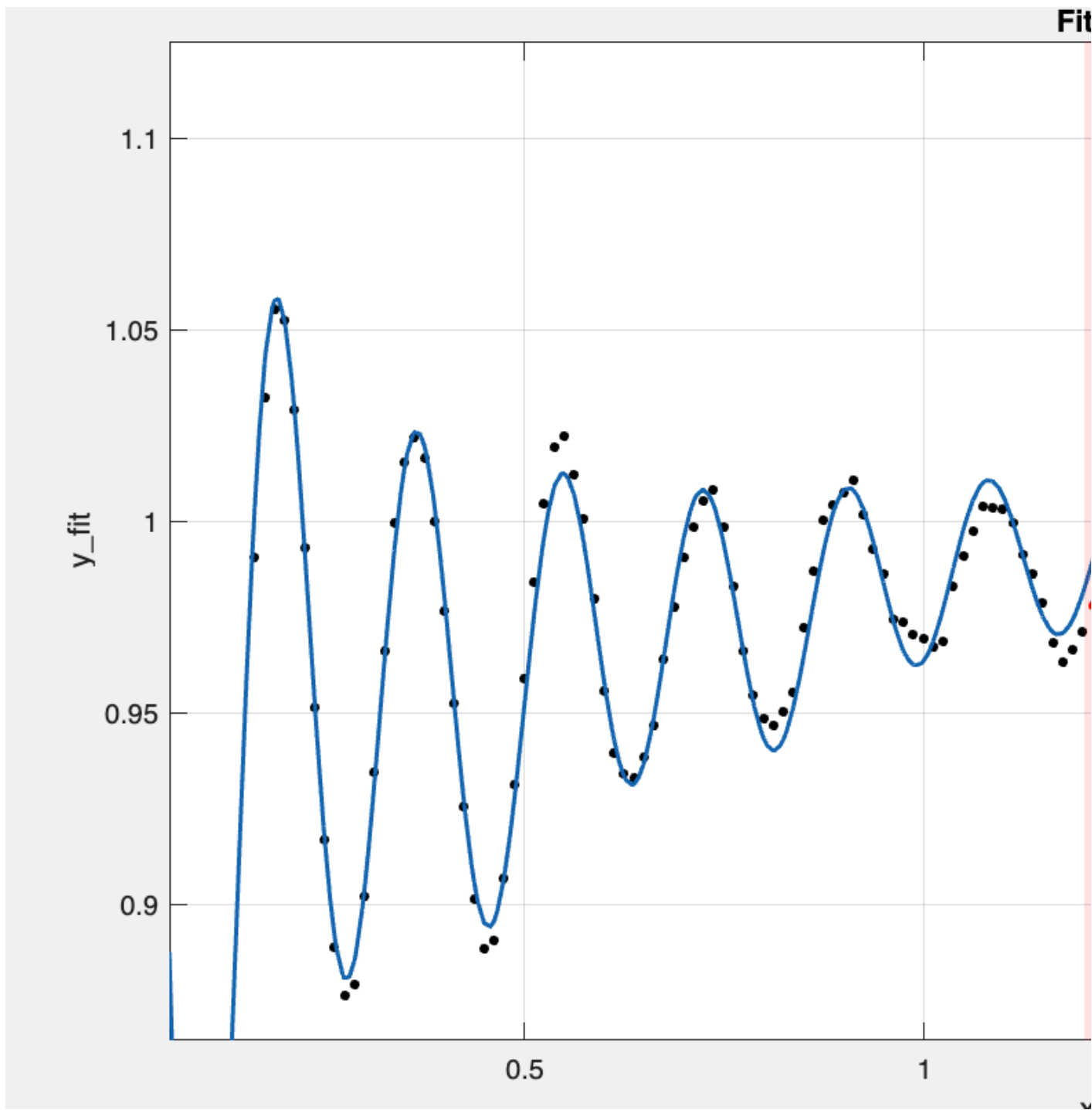
1479 cm-1
Lp: 1.9184 μm
W: 0.3726 μm



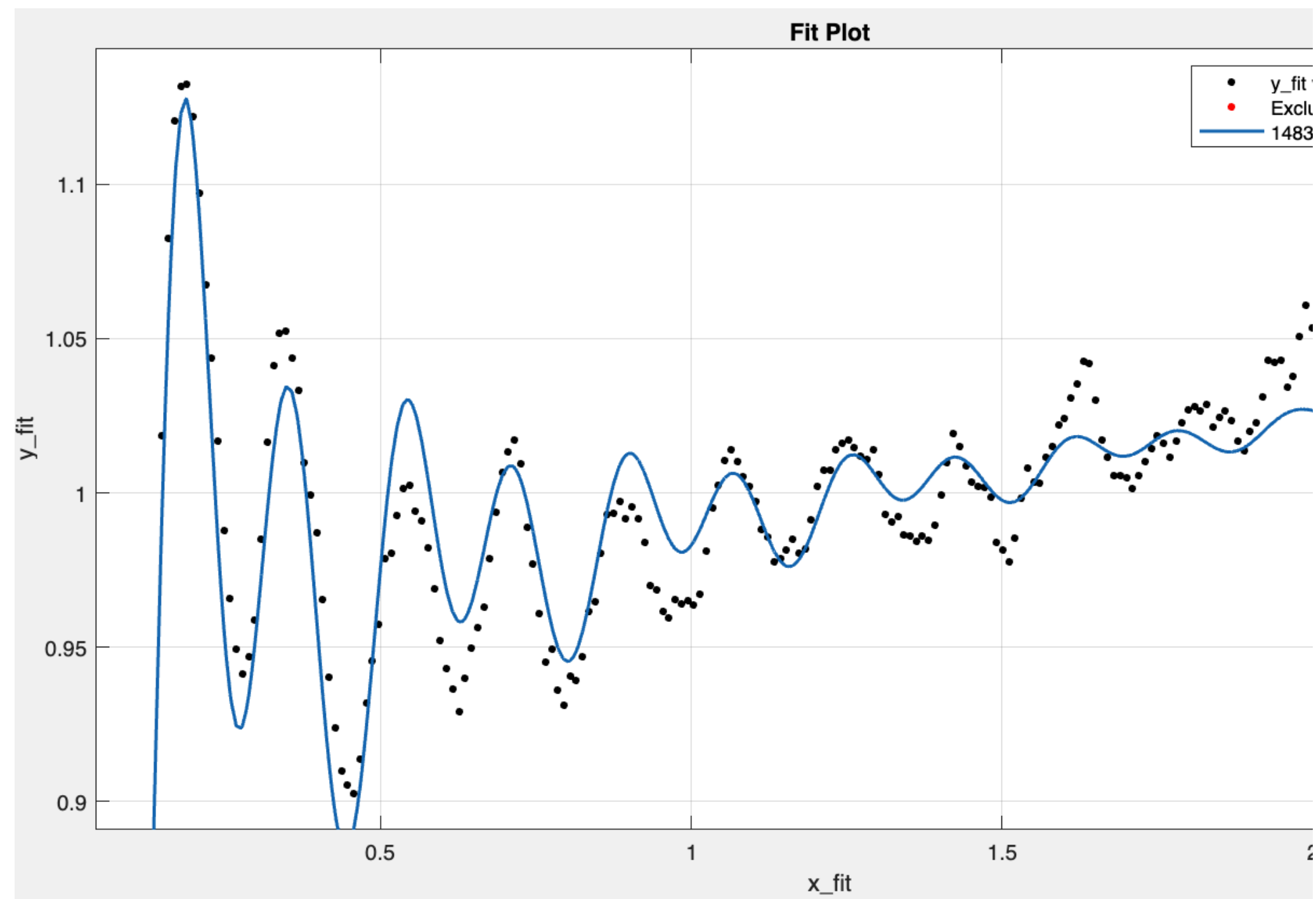
1480 cm-1
Lp: 1.8680 μm
W: 0.3626 μm



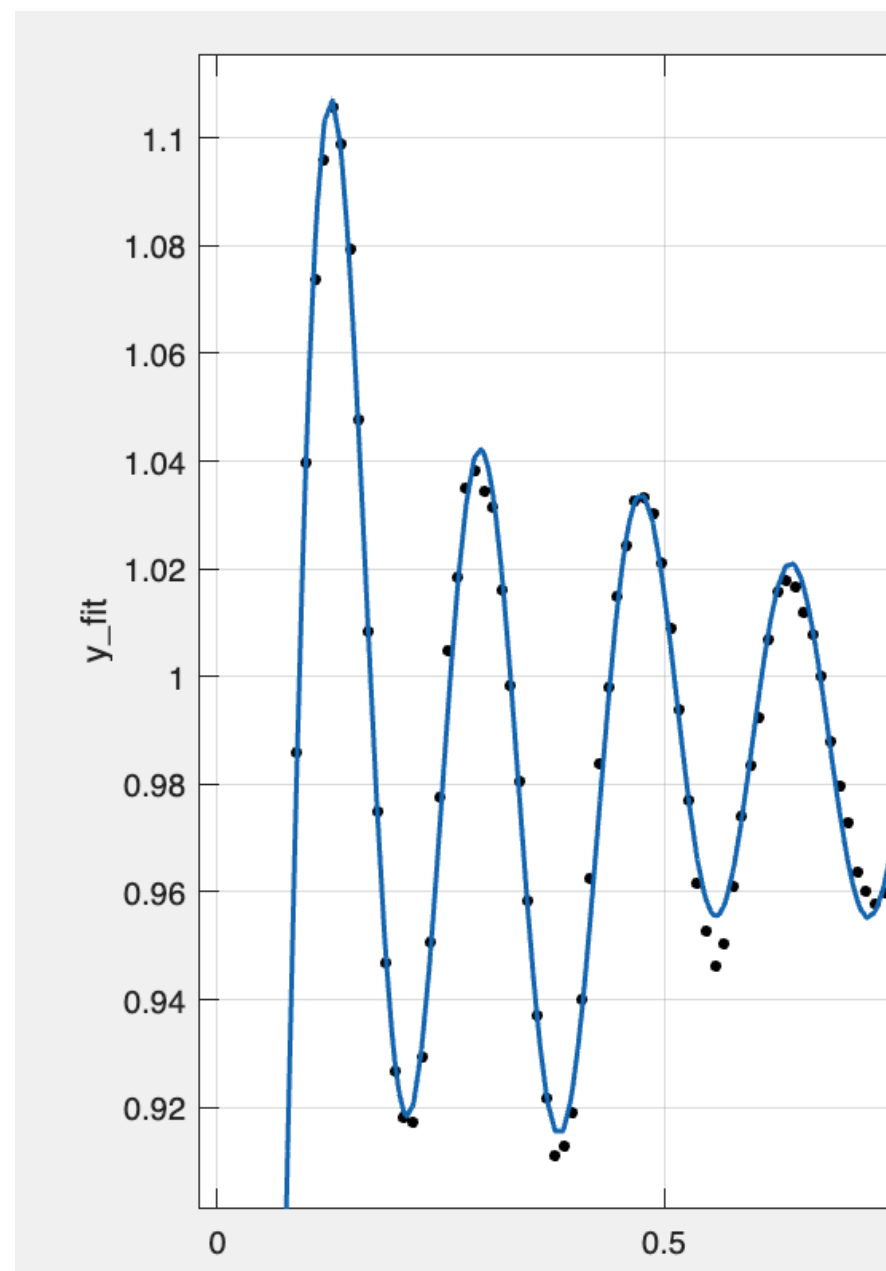
1481 cm-1
Lp: 2.0727 μm
W: 0.3593 μm



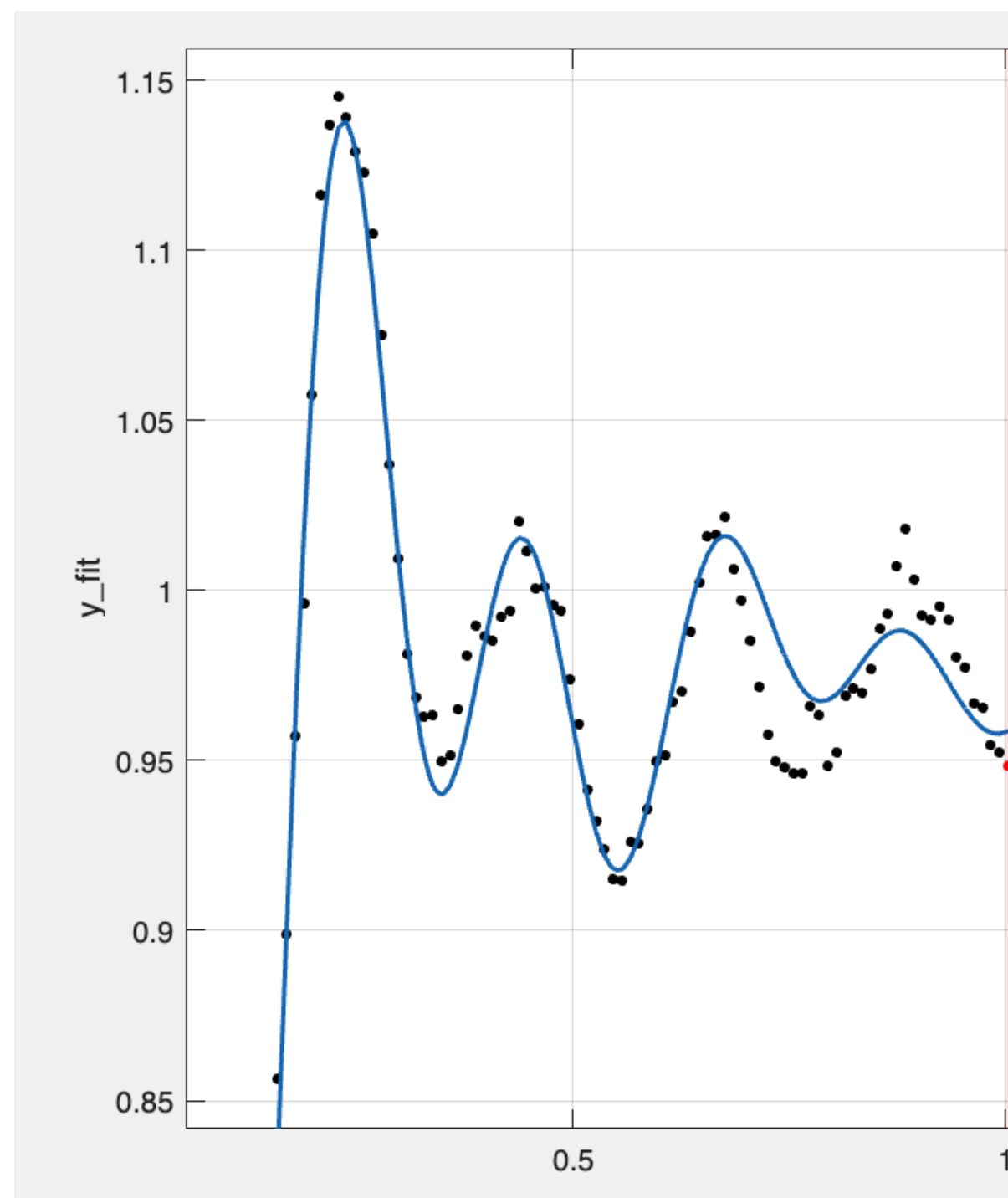
1482 cm-1
Lp: 2.4472 μm
W: 0.3567 μm



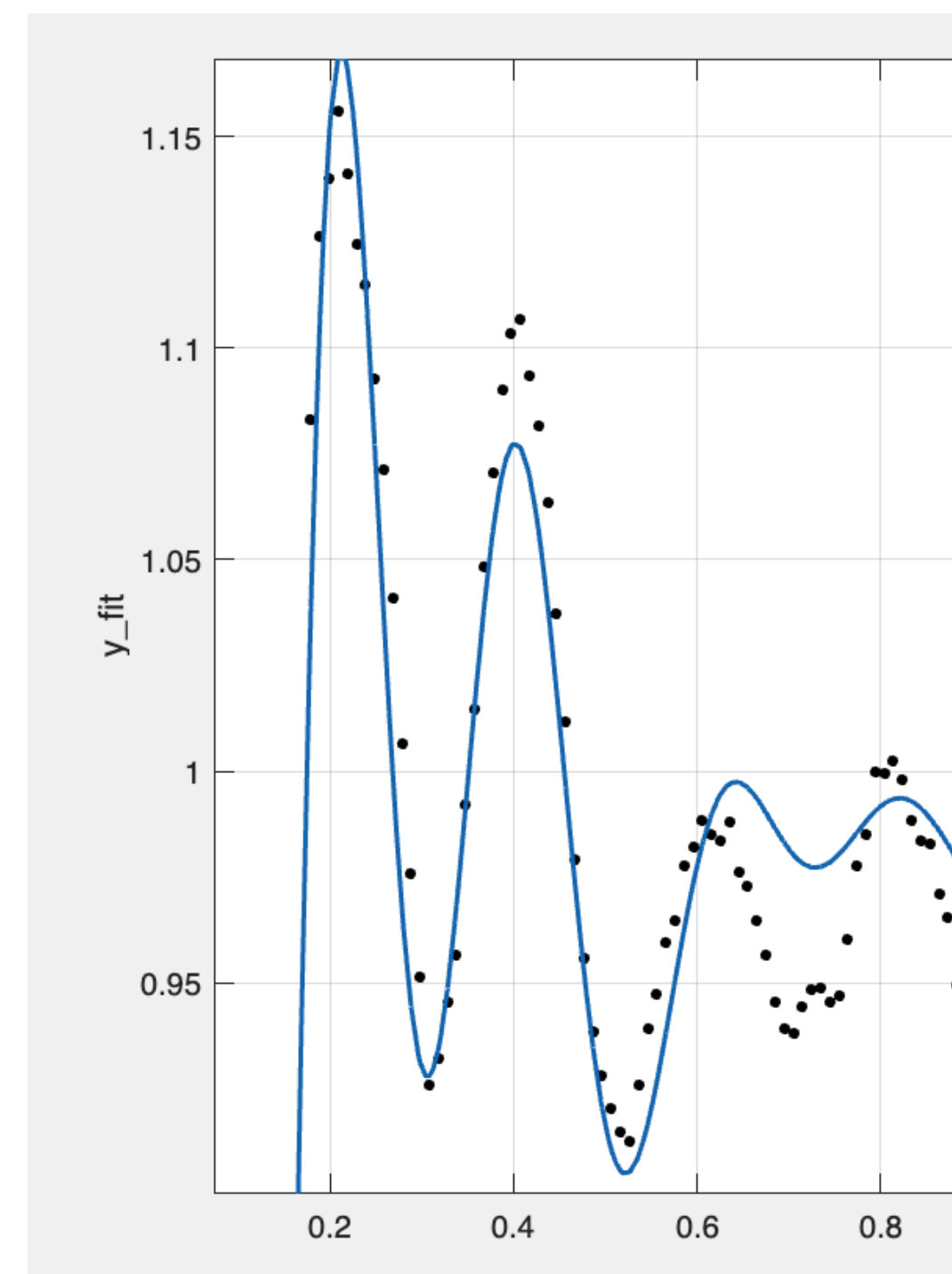
1483 cm-1
Lp: 1.3951 μm
W: 0.3568 μm



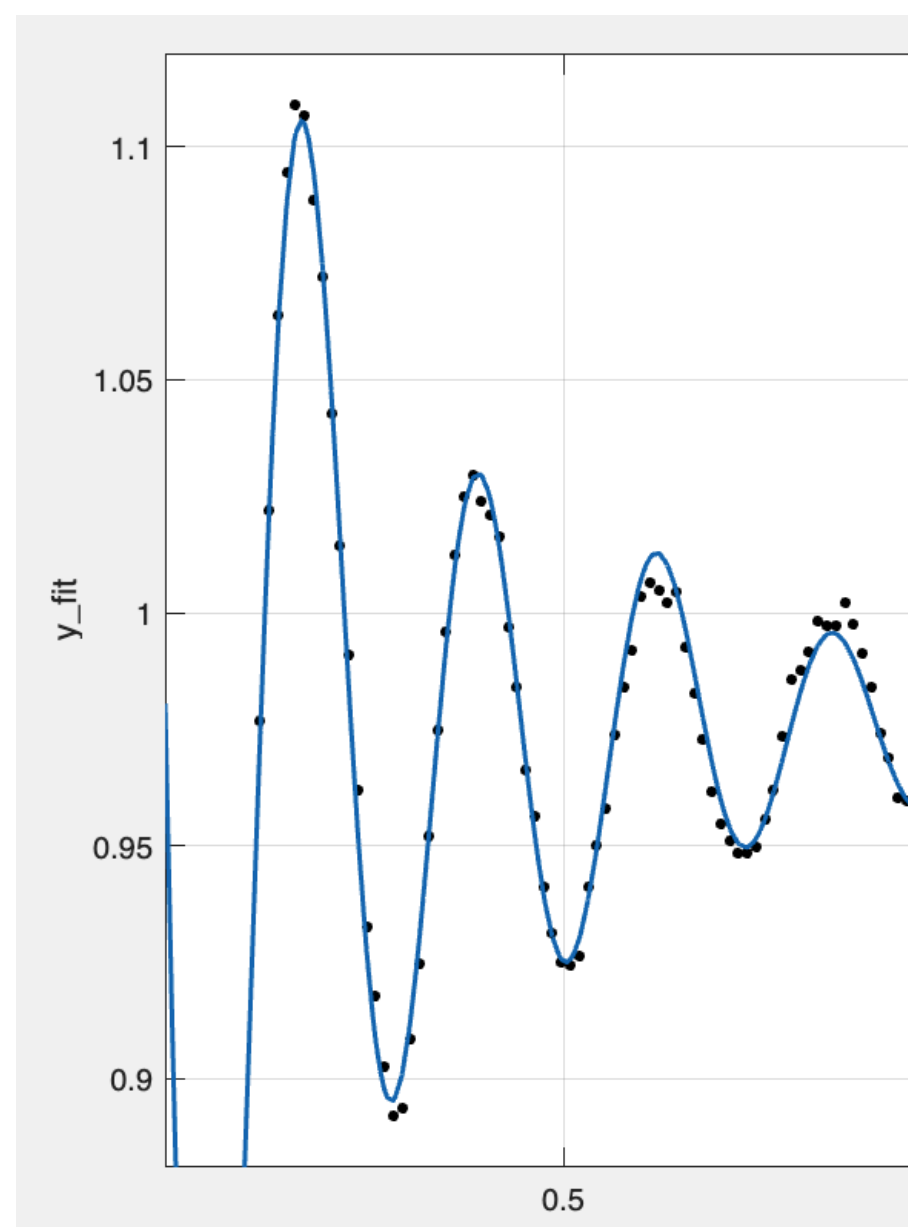
1484 cm-1
Lp: 2.4777 μm
W: 0.3454 μm



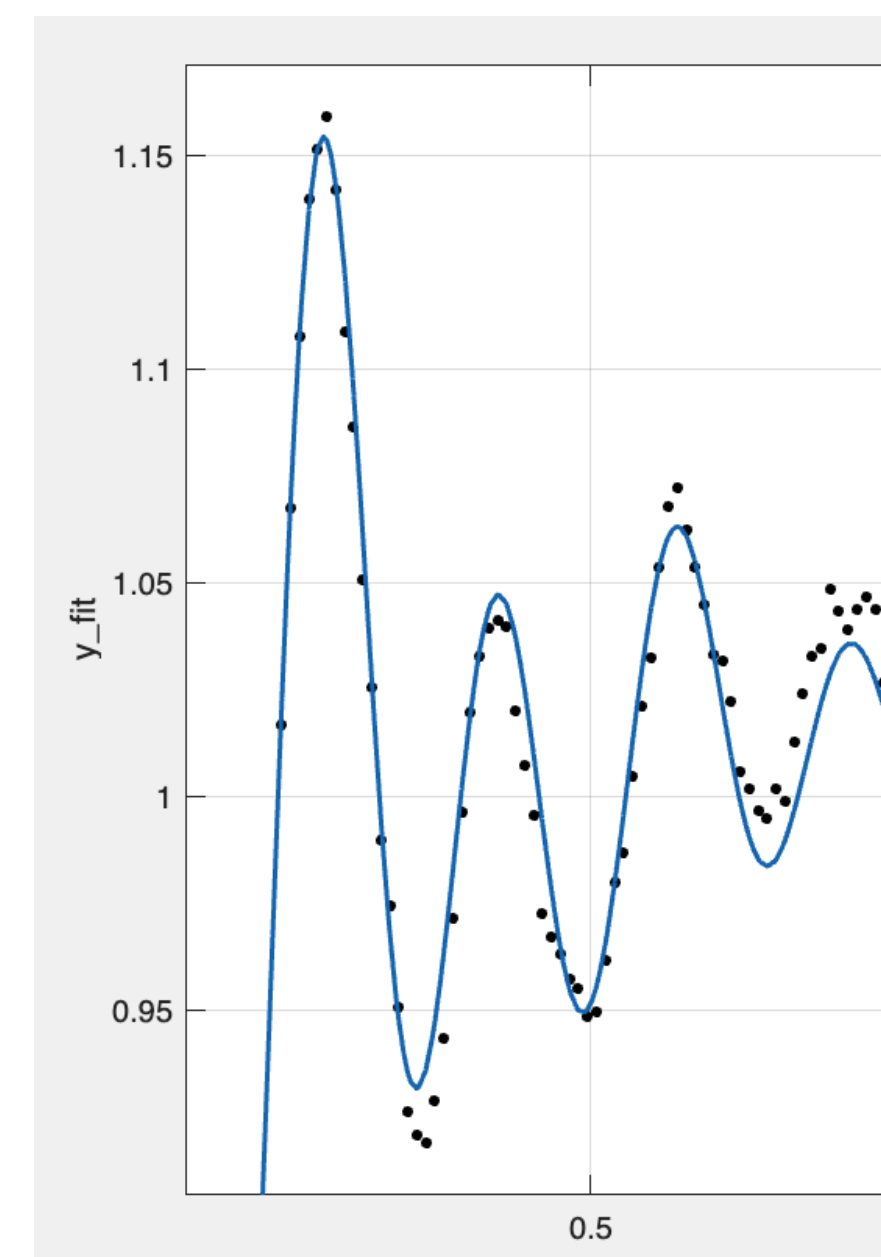
1467.5 cm⁻¹
 Lp: 1.0000 um
 W: 0.4387 um



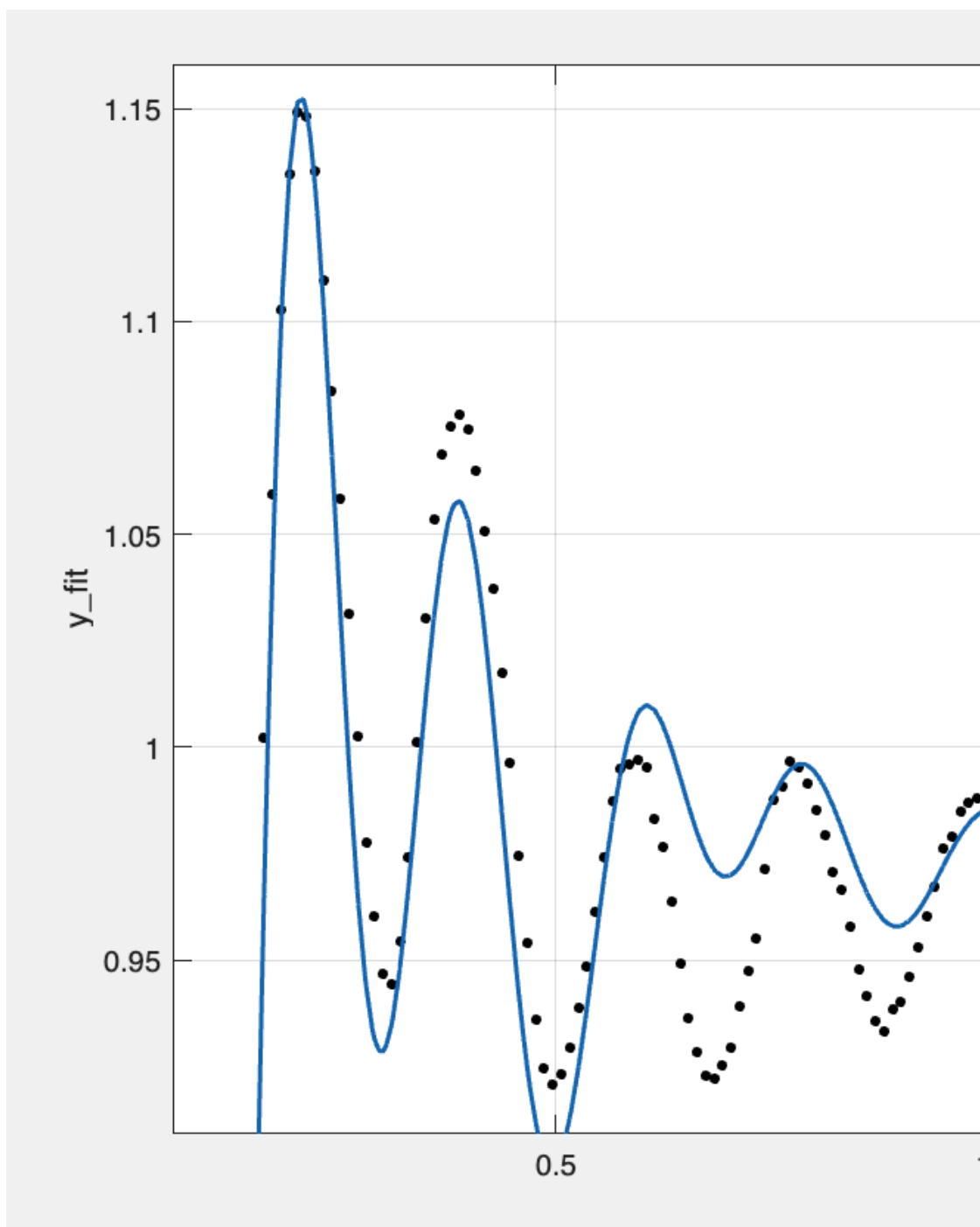
1473 cm⁻¹
 Lp: 0.5002 um
 W: 0.4249 um



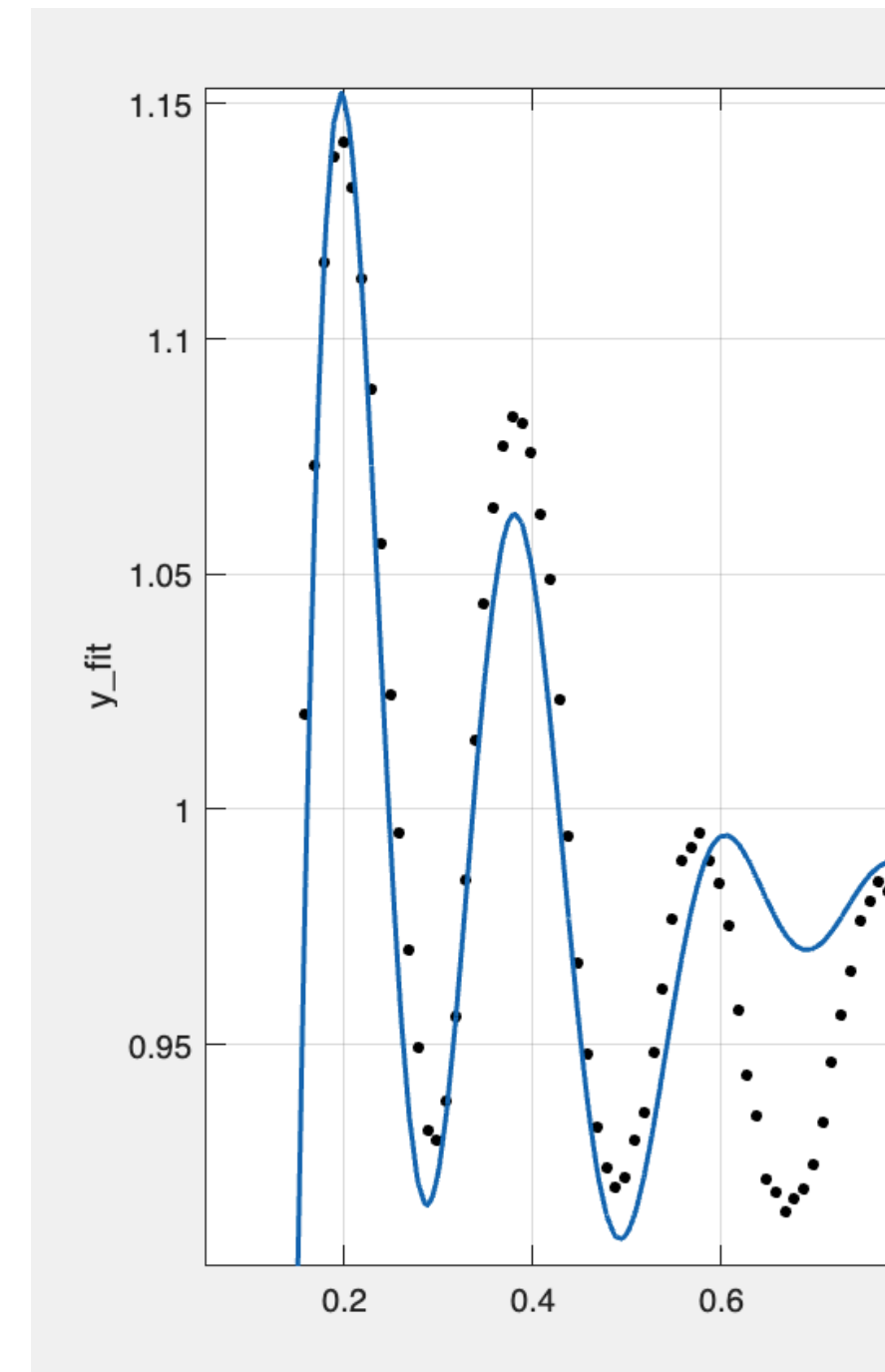
1474 cm⁻¹
 Lp: 1.1343 um
 W: 0.3969 um



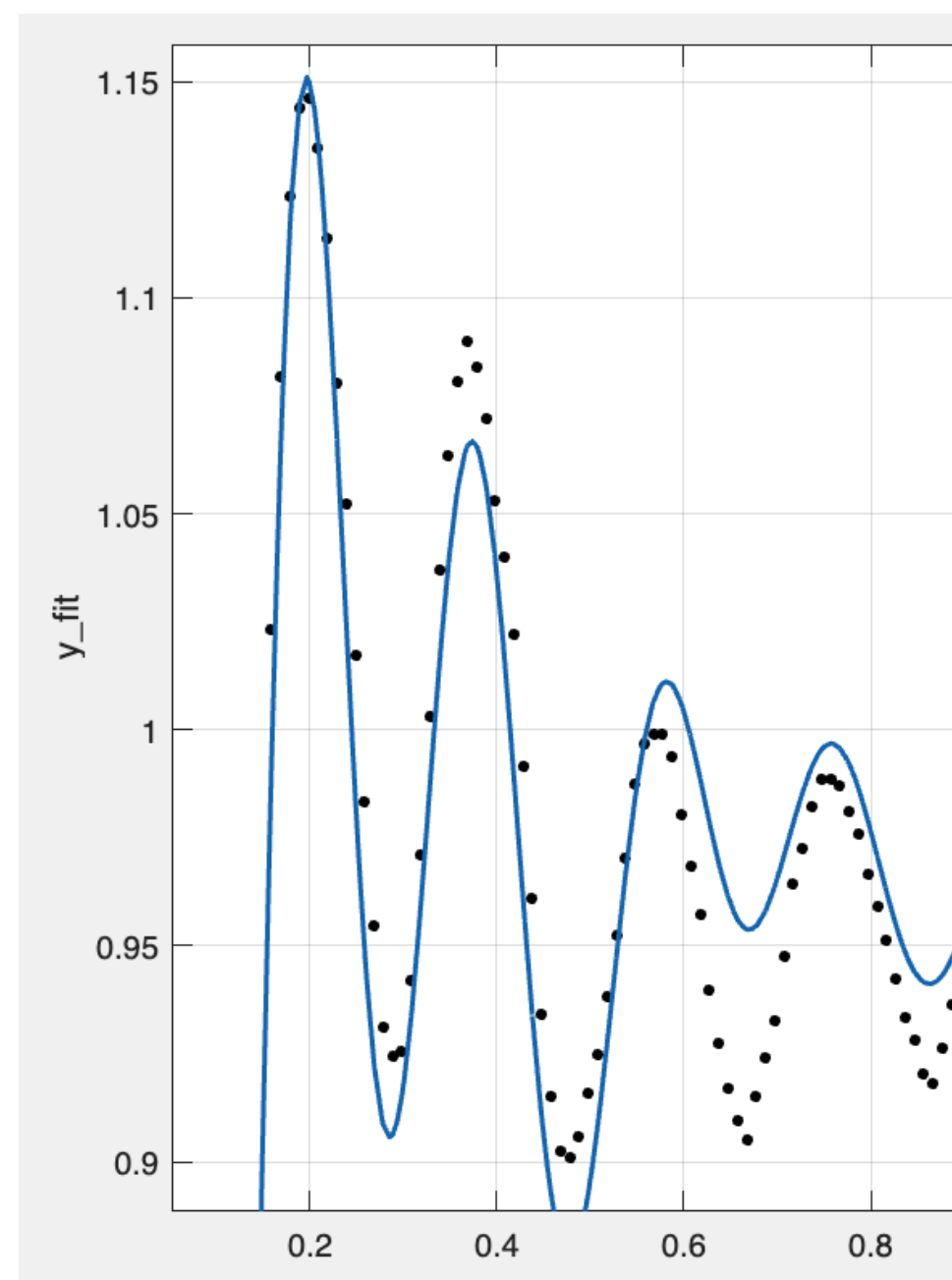
1475.5 cm⁻¹
 Lp: 1.6345 um
 W: 0.3886 um



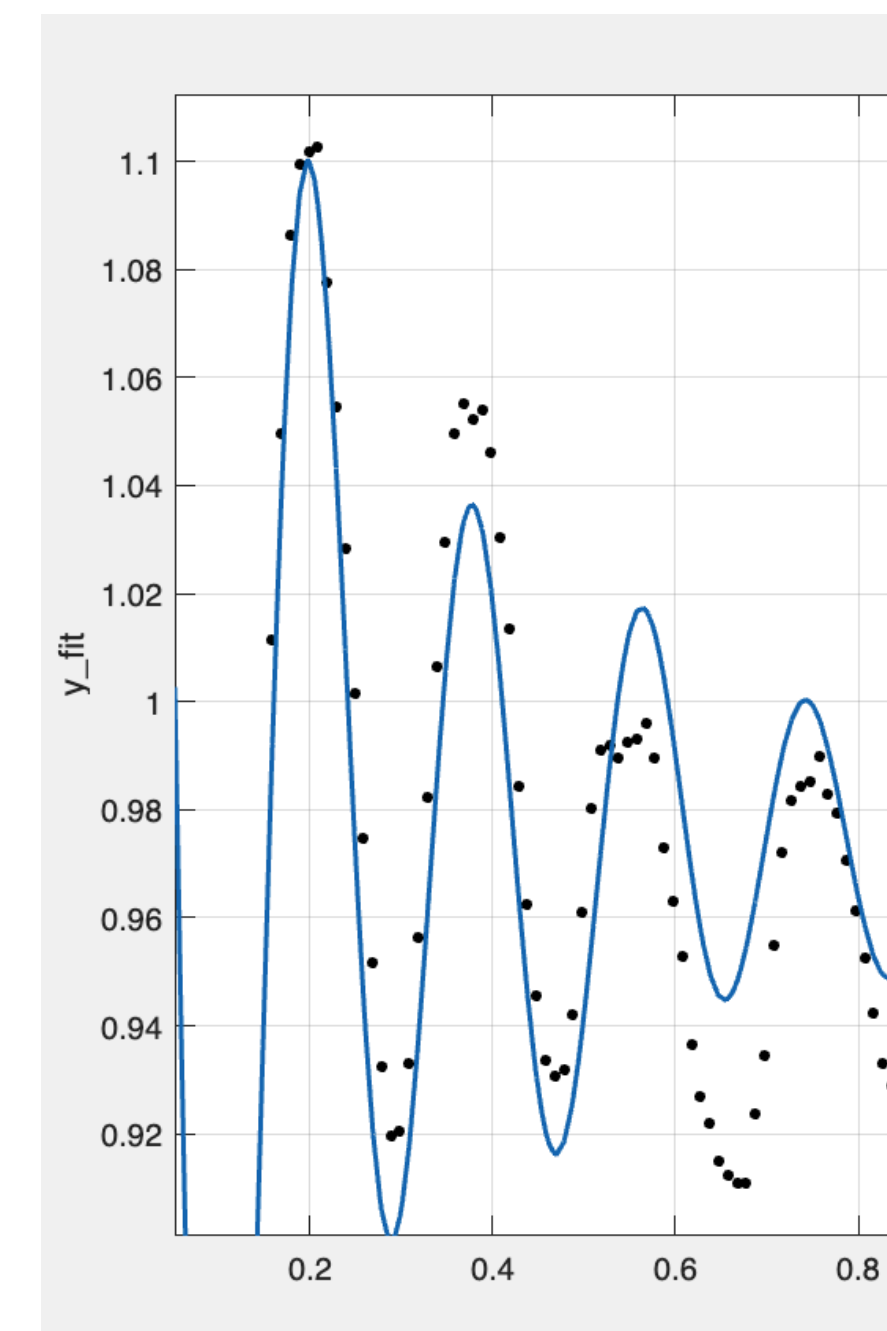
1476.5 cm^{-1}
 Lp: 0.6997 μm
 W: 0.4026 μm



1477.5 cm^{-1}
 Lp: 0.5095 μm
 W: 0.4033 μm



1478.5 cm^{-1}
 Lp: 0.8242 μm
 W: 0.3841 μm



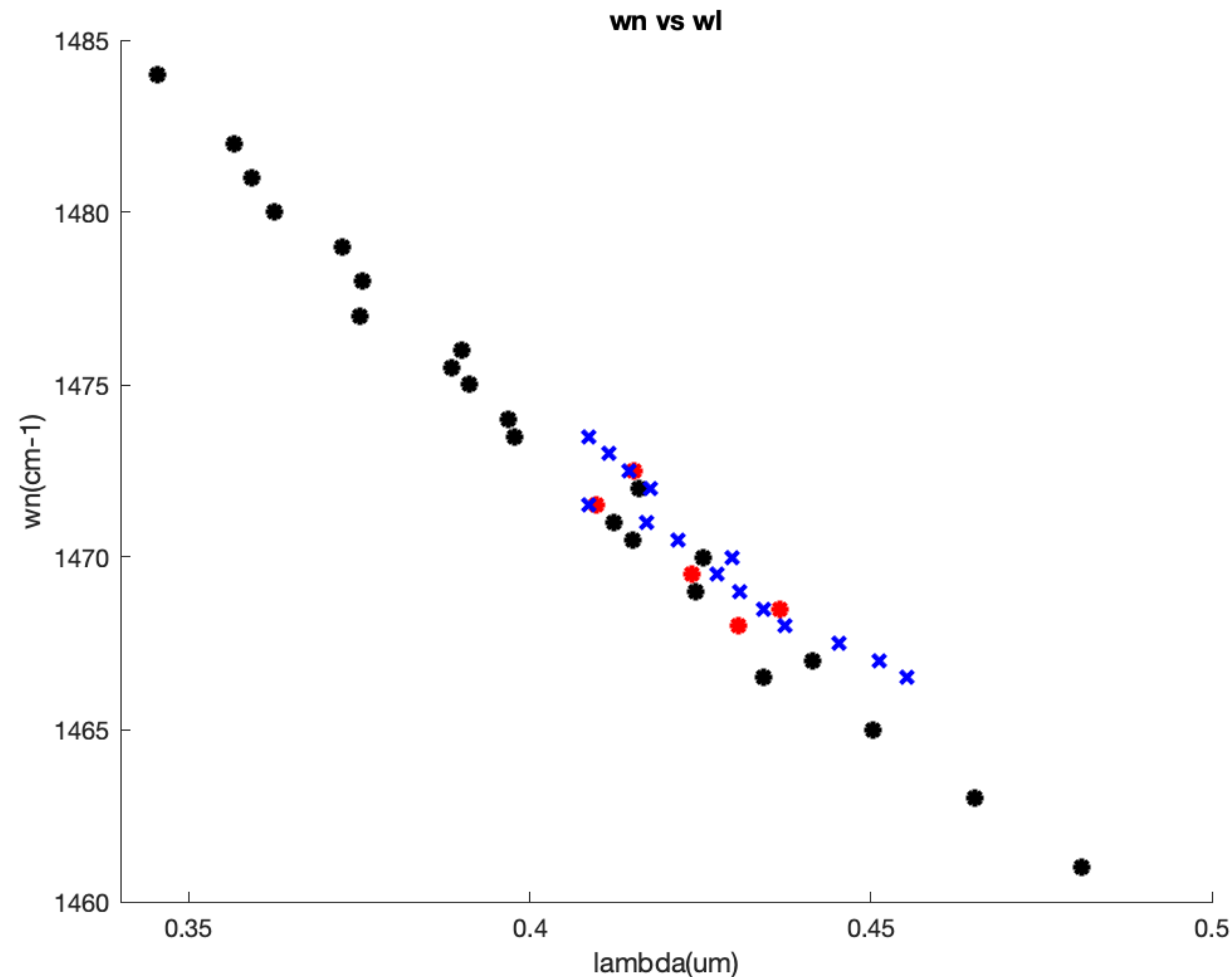
1479.5 cm^{-1}
 Lp: 1.3633 μm
 W: 0.3641 μm

| Wavenumber (cm-1) | | lambda p (um) | L p (um) | |
|-------------------|---|---------------|----------|--------------|
| 1450 | X | 0.5945 | 1.9425 | |
| 1461 | X | 0.4809 | 1.8887 | |
| 1463 | X | 0.4652 | 1.4715 | |
| 1465 | X | 0.4504 | 1.4112 | |
| 1466.5 | X | 0.4343 | 1.6359 | |
| 1467 | X | 0.4414 | 1.5405 | |
| 1468 | X | 0.4306 | 1.1949 | Not good fit |
| 1468.5 | X | 0.4367 | 1.2166 | Not good fit |
| 1469 | X | 0.4244 | 1.3898 | |
| 1469.5 | X | 0.4238 | 1.1610 | Not good fit |
| 1470 | X | 0.4254 | 1.5615 | |
| 1470.5 | X | 0.4151 | 1.8091 | |
| 1471 | X | 0.4124 | 1.3696 | |
| 1471.5 | X | 0.4097 | 1.4276 | Not good fit |
| 1472 | X | 0.4160 | 1.4892 | |
| 1472.5 | X | 0.4153 | 1.2918 | Not good fit |
| 1473.5 | X | 0.3978 | 1.5801 | |
| 1475 | X | 0.3912 | 1.6097 | |
| 1476 | X | 0.3901 | 1.6046 | |
| 1477 | X | 0.3751 | 1.7596 | |
| 1478 | X | 0.3755 | 1.8028 | |
| 1479 | X | 0.3726 | 1.9184 | |
| 1480 | X | 0.3626 | 1.8680 | |
| 1481 | X | 0.3593 | 2.0727 | |
| 1482 | X | 0.3567 | 2.4472 | |
| 1483 | X | 0.3568 | 1.3951 | Not good fit |
| 1484 | X | 0.3454 | 2.4777 | |

May 19

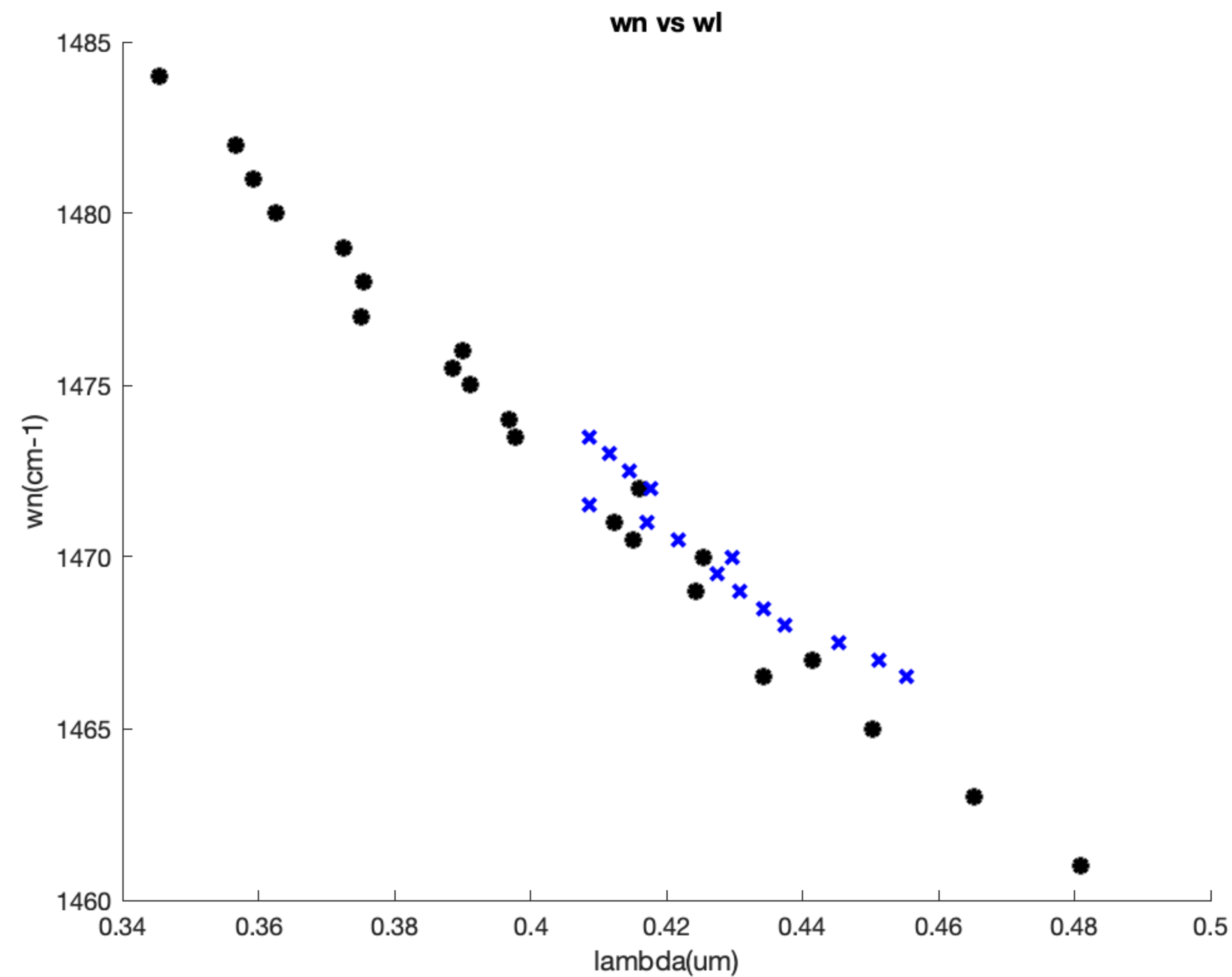
| Wavenumber (cm-1) | | lambda_p (um) | L_p (um) | |
|-------------------|---|---------------|----------|--------------|
| 1467.5 | X | 0.4387 | 1.0000 | Not good fit |
| 1473 | X | 0.4249 | 0.5002 | Not good fit |
| 1474 | X | 0.3969 | 1.1343 | |
| 1475.5 | X | 0.3886 | 1.6345 | |
| 1476.5 | X | 0.4026 | 0.6997 | Not good fit |
| 1477.5 | X | 0.4033 | 0.5095 | Not good fit |
| 1478.5 | X | 0.3841 | 0.8242 | Not good fit |
| 1479.5 | X | 0.3641 | 1.3633 | Not good fit |

Wavenumber vs Propagation wavelength



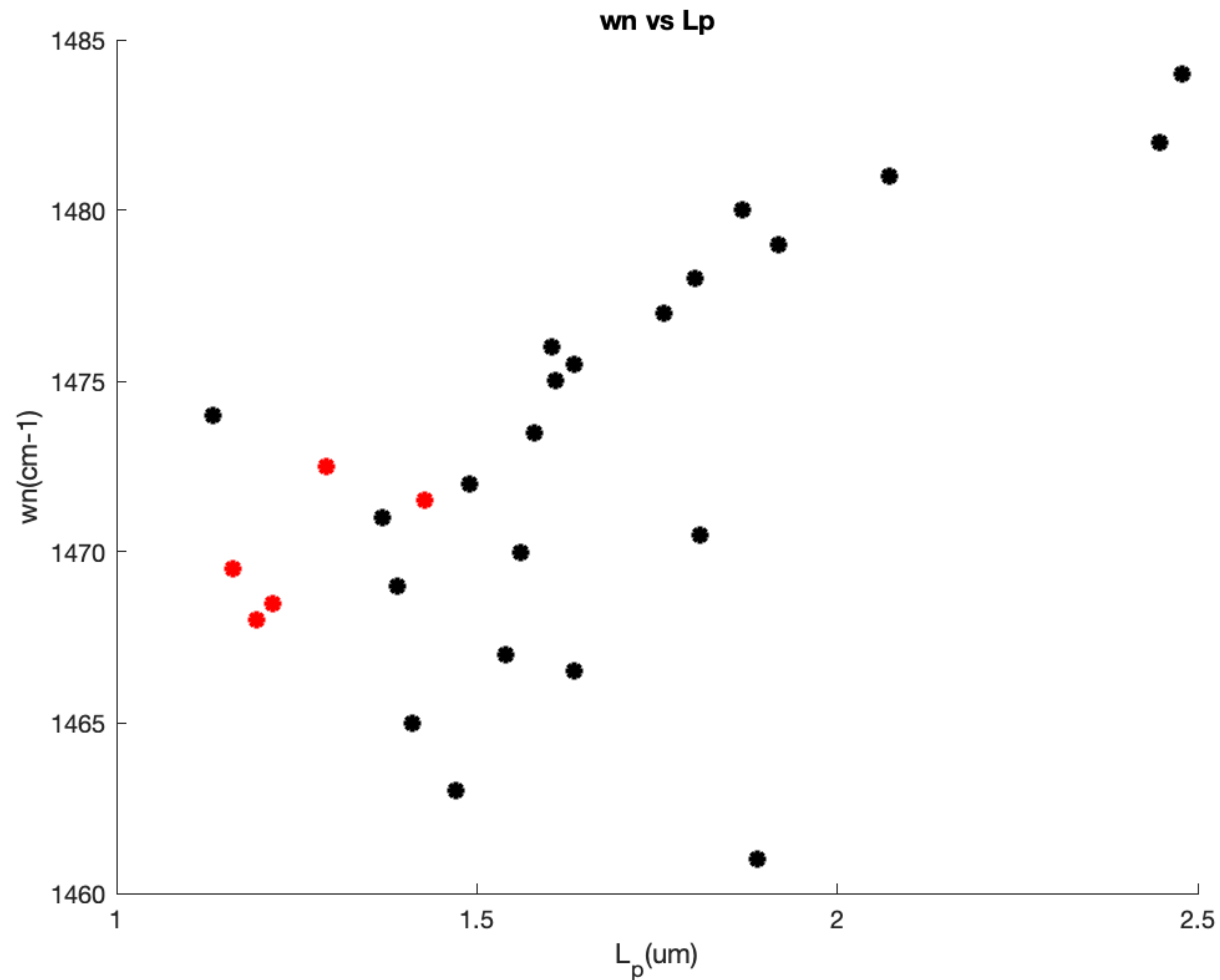
Confident in black points;
Less confidence in red points
due to bad fitting
Blue crosses are extracted manually

Wavenumber vs Propagation wavelength



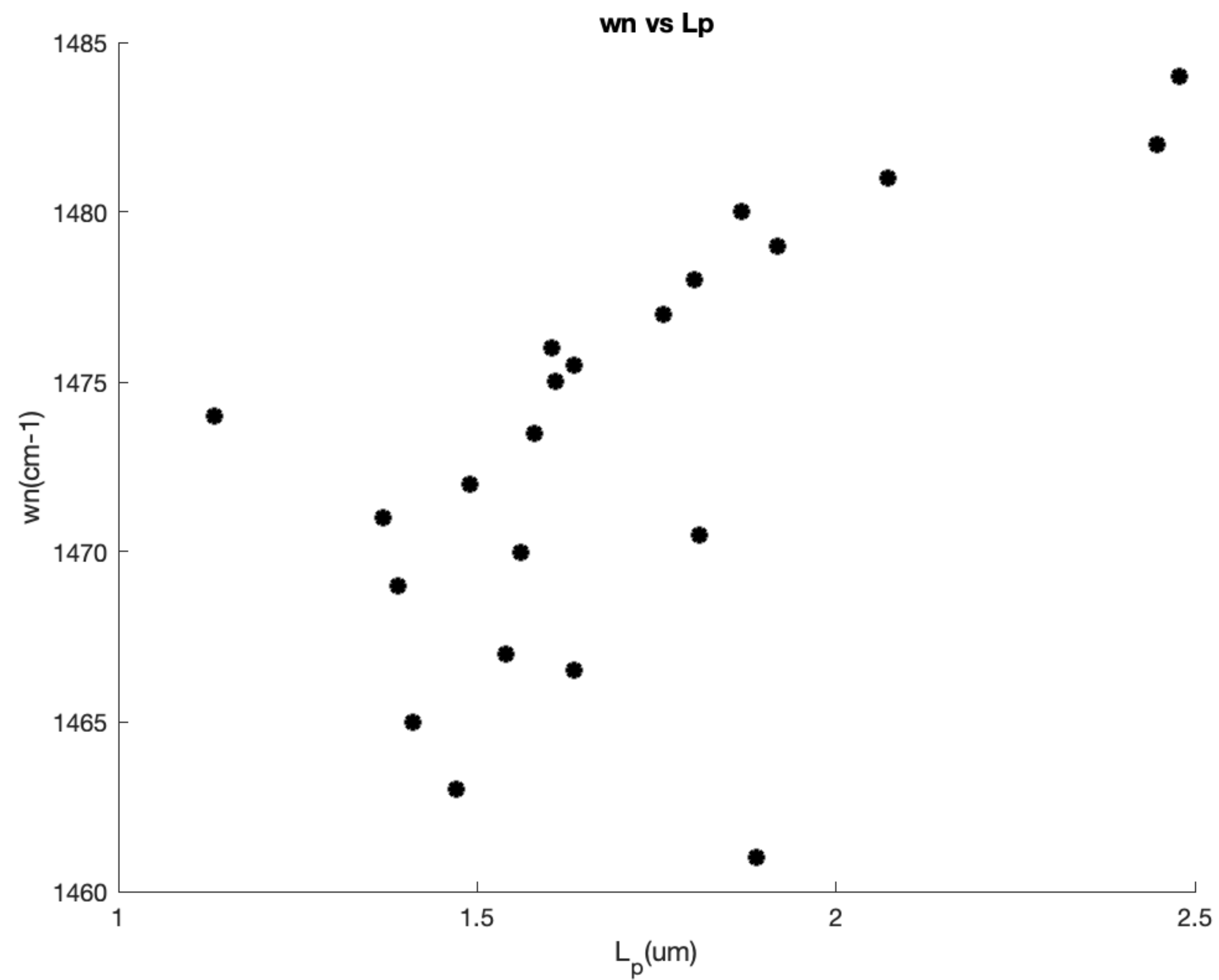
Black dots extracted using fitting
Blue crosses are extracted manually

Wavenumber vs Propagation length



Confident in black points;
Less confidence in red points
due to bad fitting

Wavenumber vs Propagation length



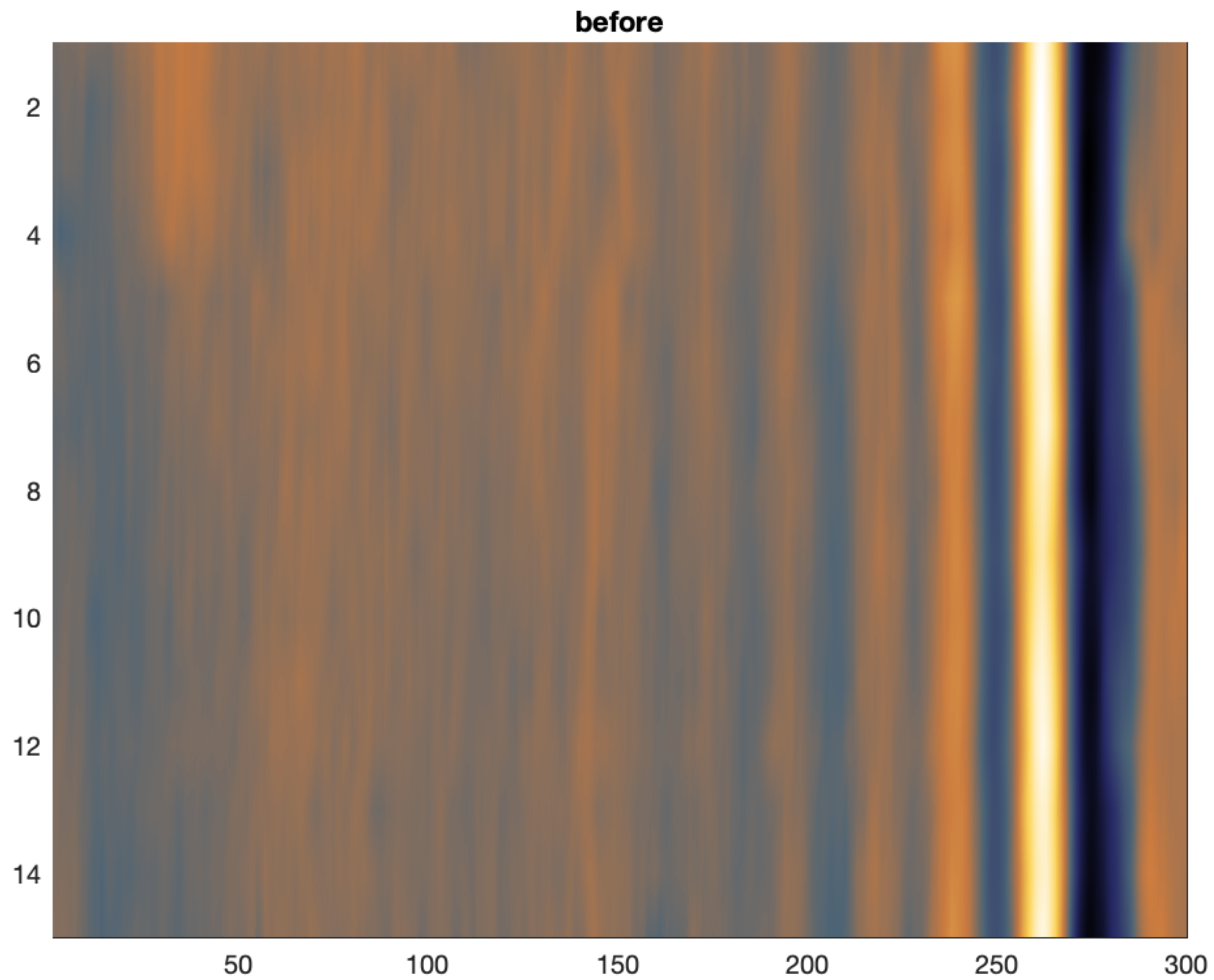
Next Steps

- 1. For some wavenumber, multiple set exist. Can use such as validation/error bar.
- 2. Room temperature data
- 3. FFT

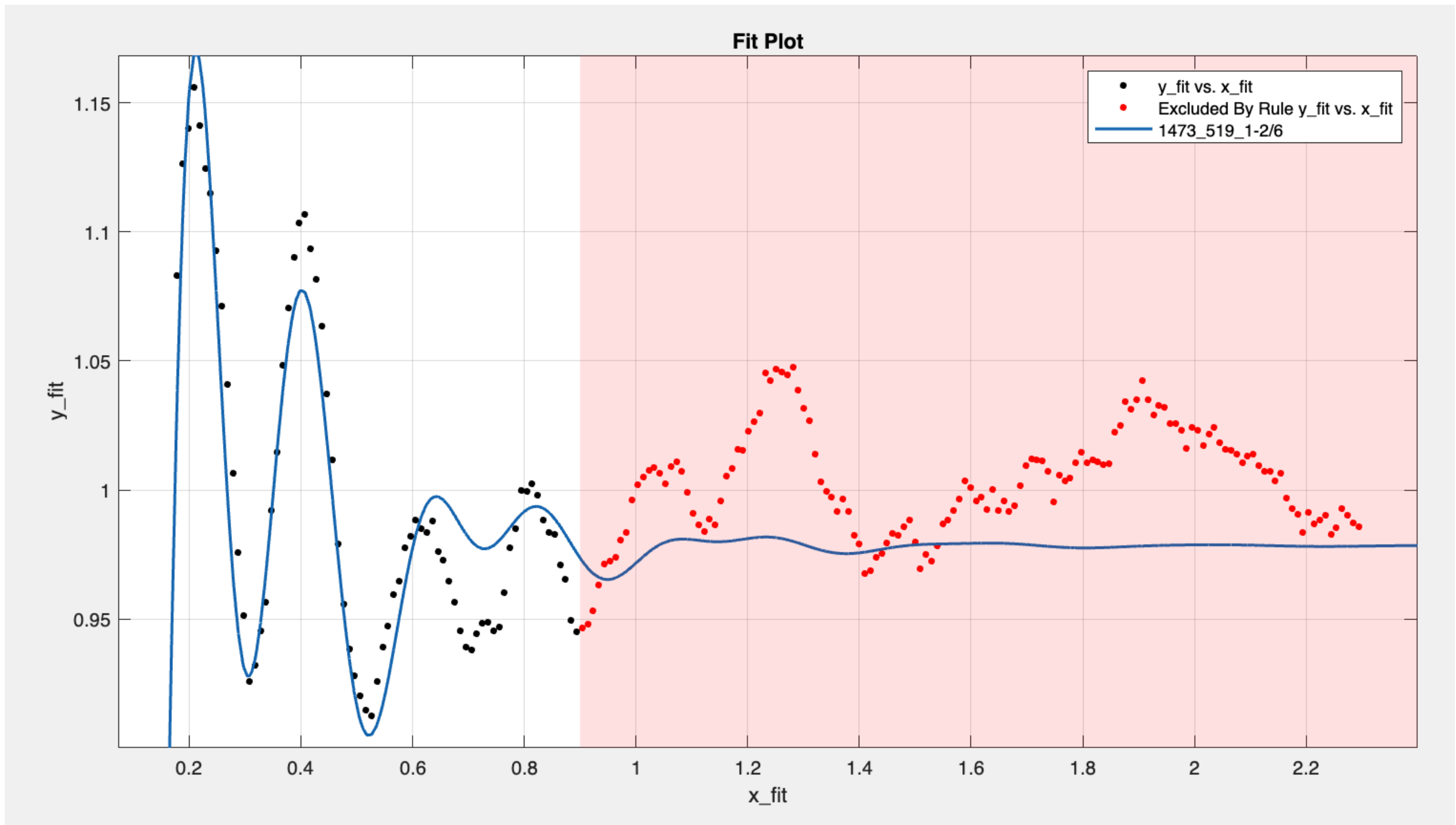
Structure of Data Folder

- 2D data
 - Raw/Original
 - Initial Alignment (shifted to align edge)
 - Final Processed (bad lines removed, used for line profile)
 - xs (x-coordinates)
 - Fitting
 - Unnormalized line profile
 - Normalized line profile
- Fitting Log: Details of which lines were used to averaged over
- Fitting parameters: Parameters in the functional form to fit data

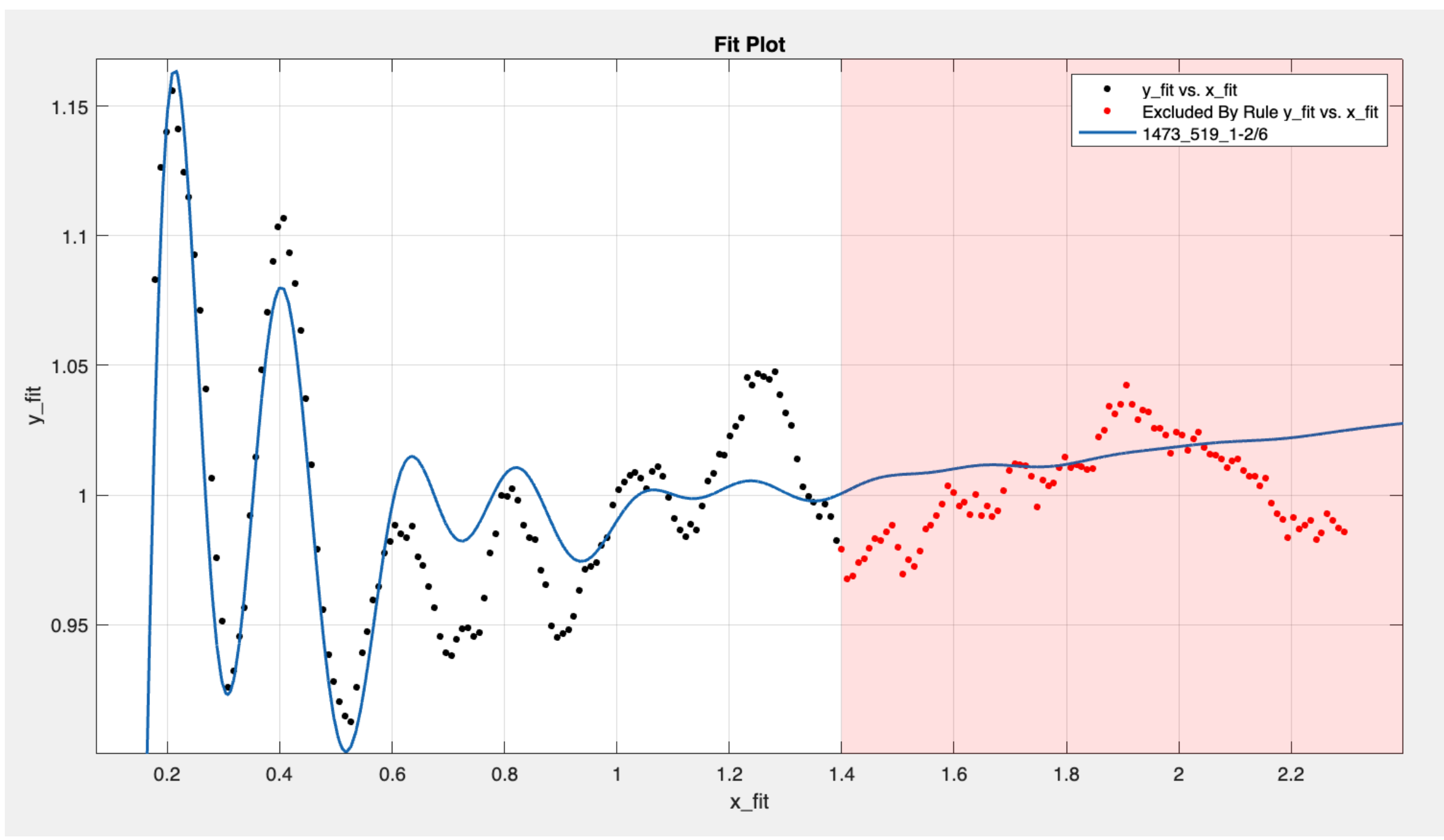
Supplementary



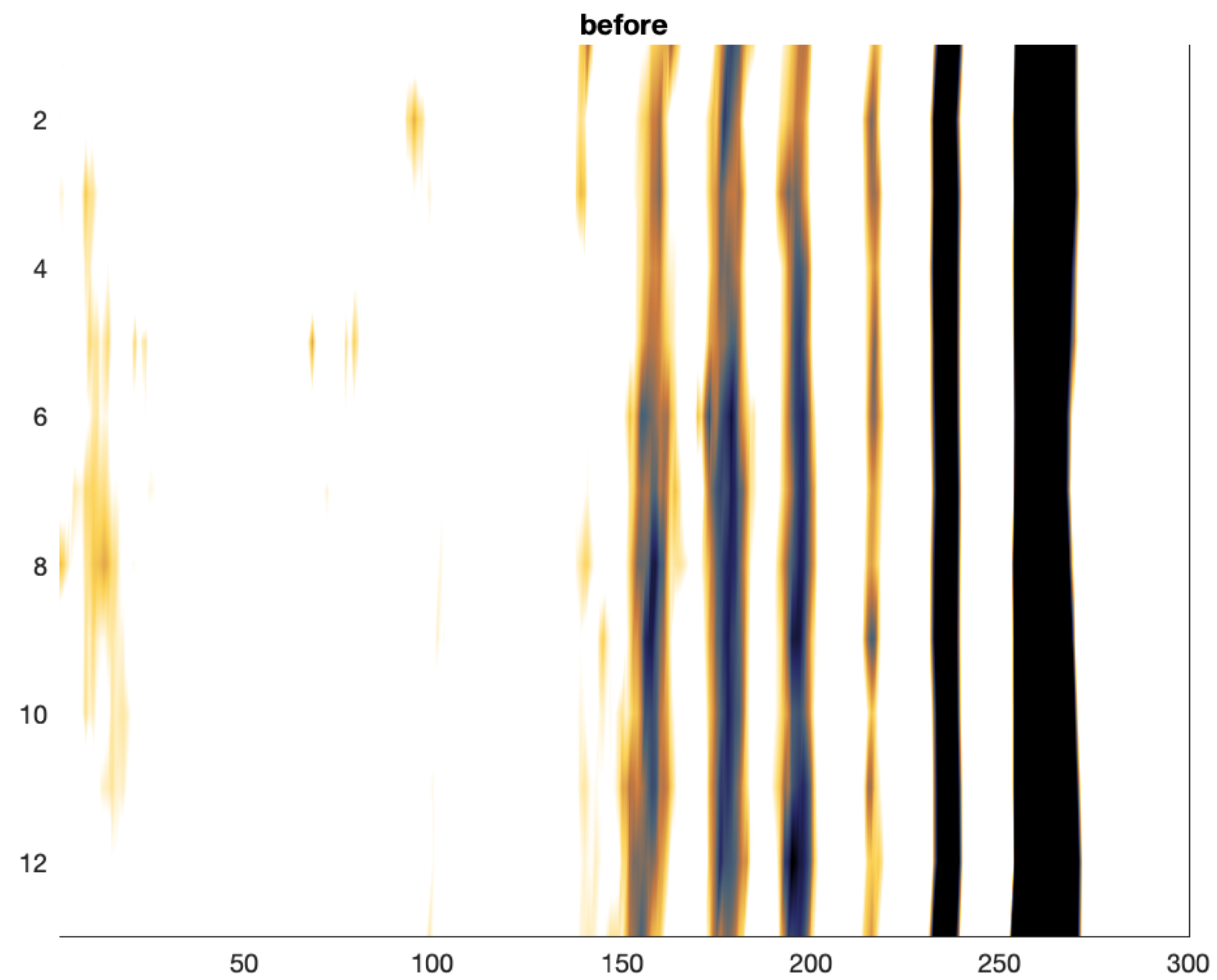
1467.5 cm⁻¹



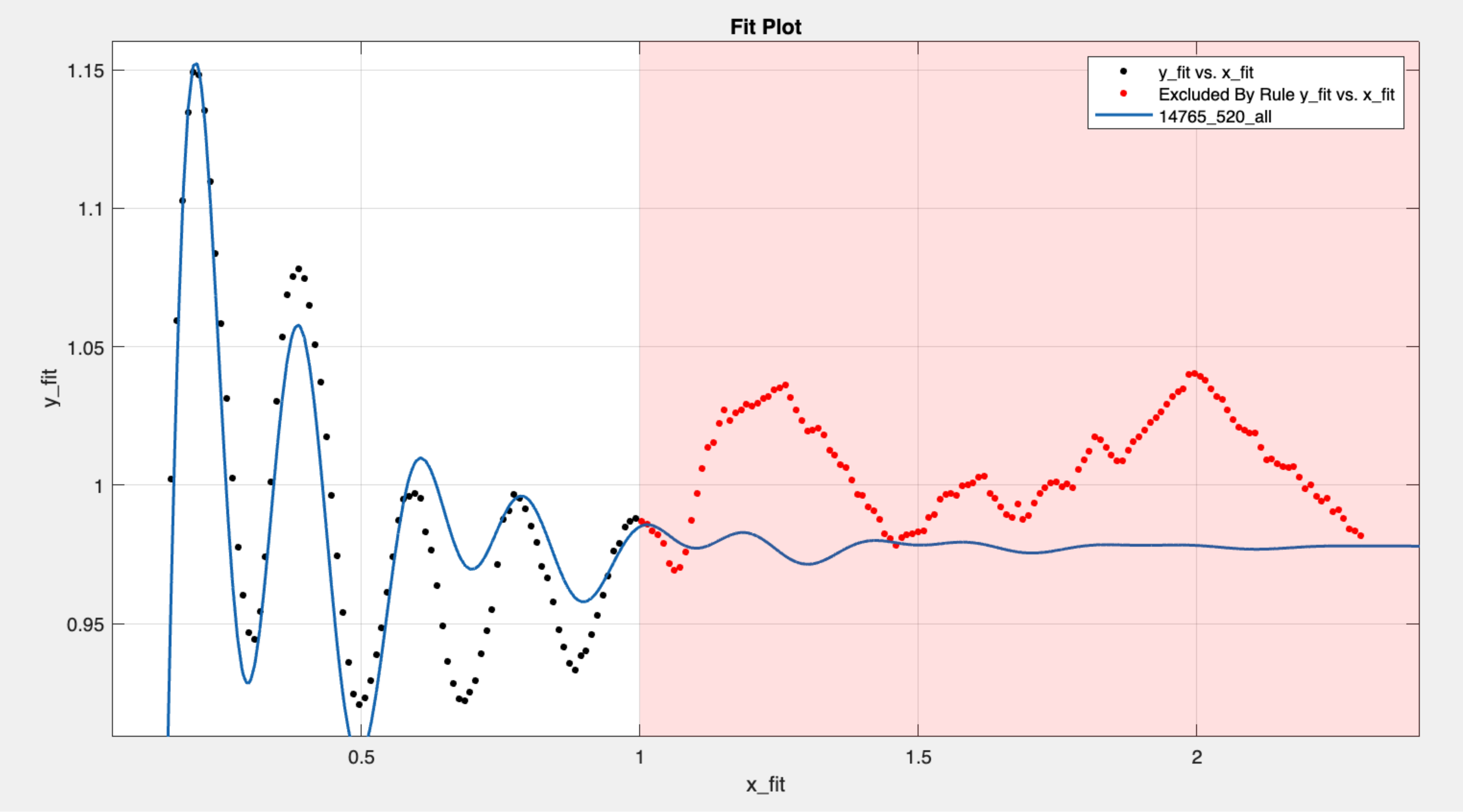
1473 cm-1
Lp: 0.5002 μm
W: 0.4249 μm

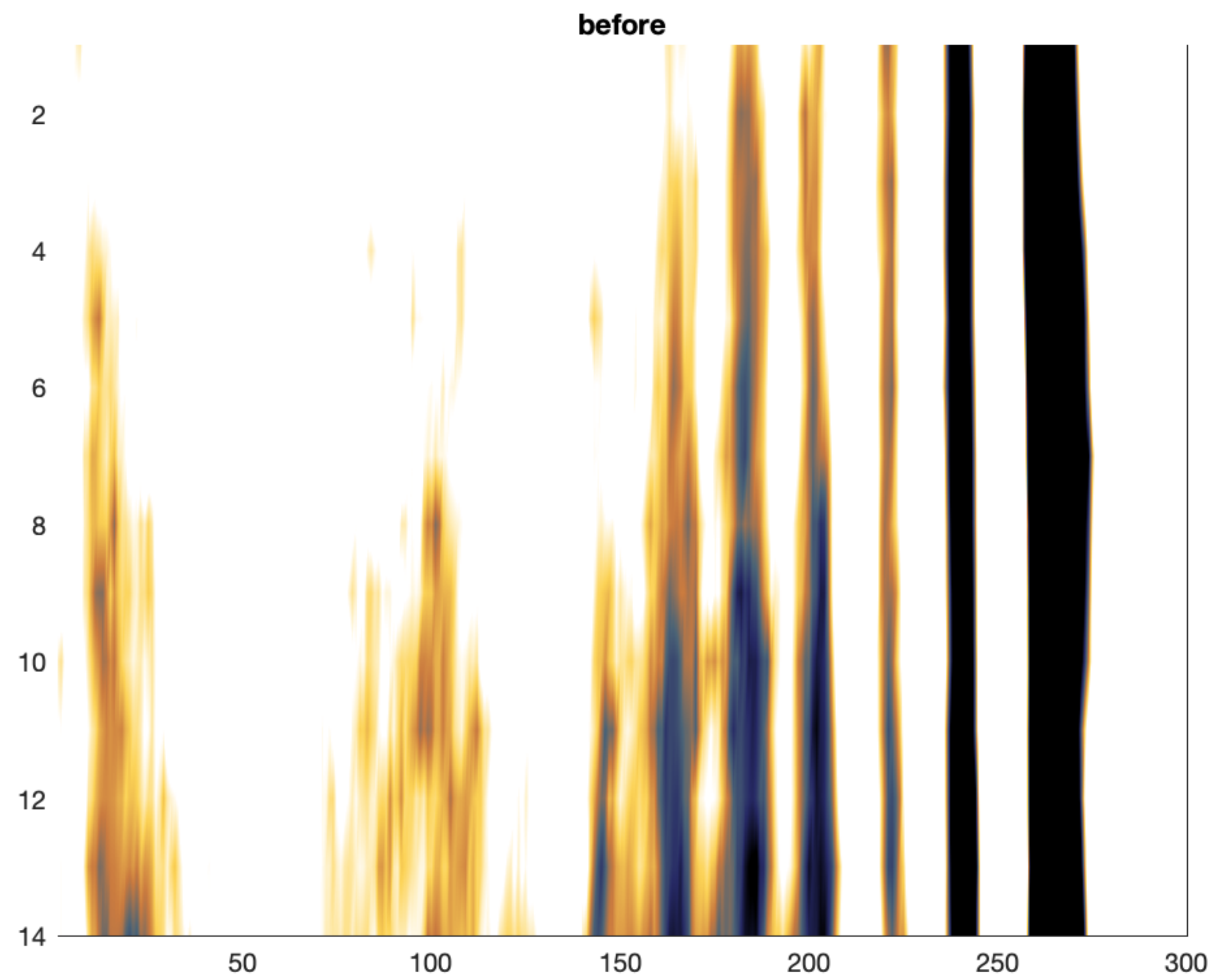


1473 cm-1
Lp: 0.6300 μm
W: 0.4189 μm

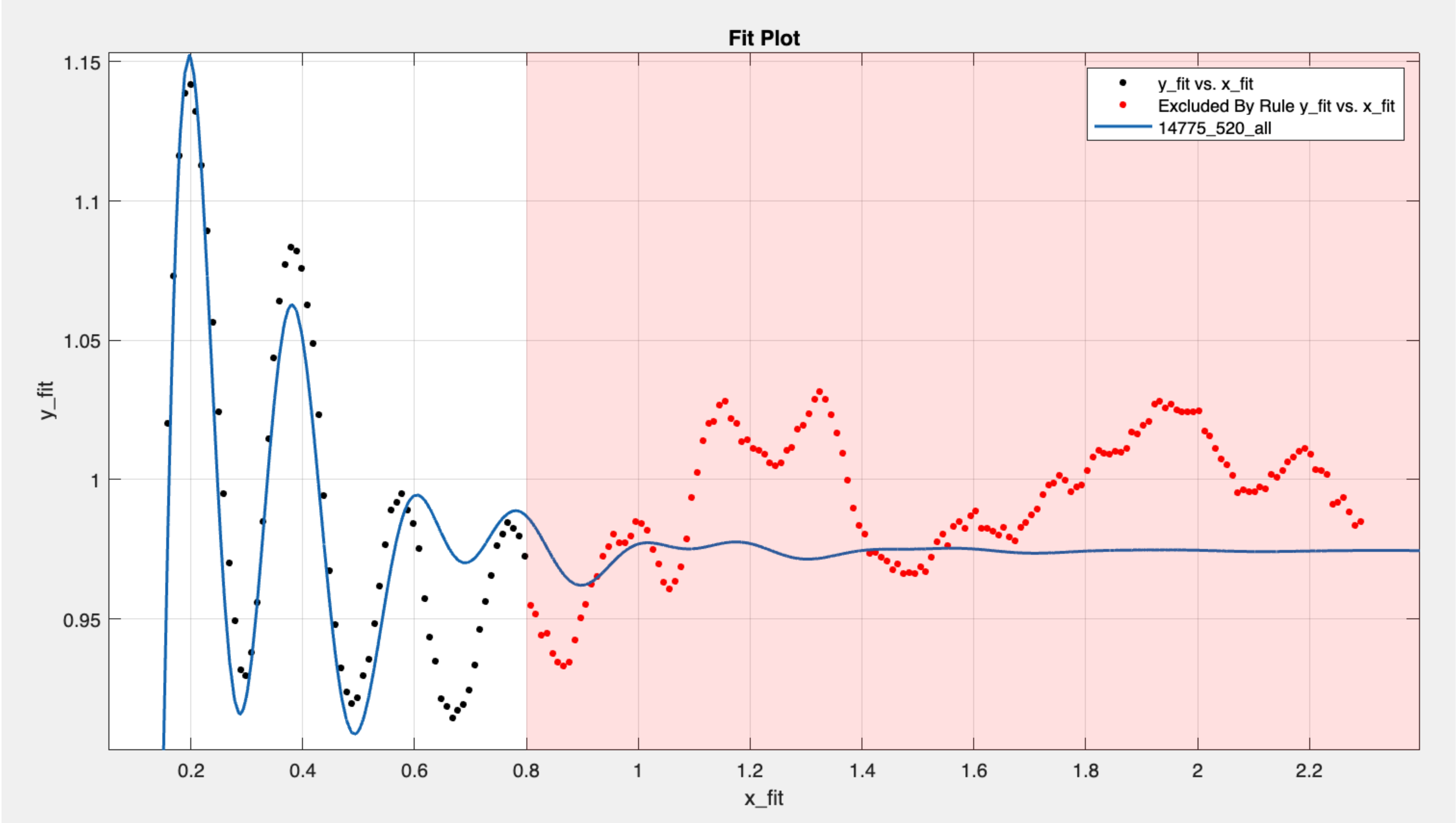


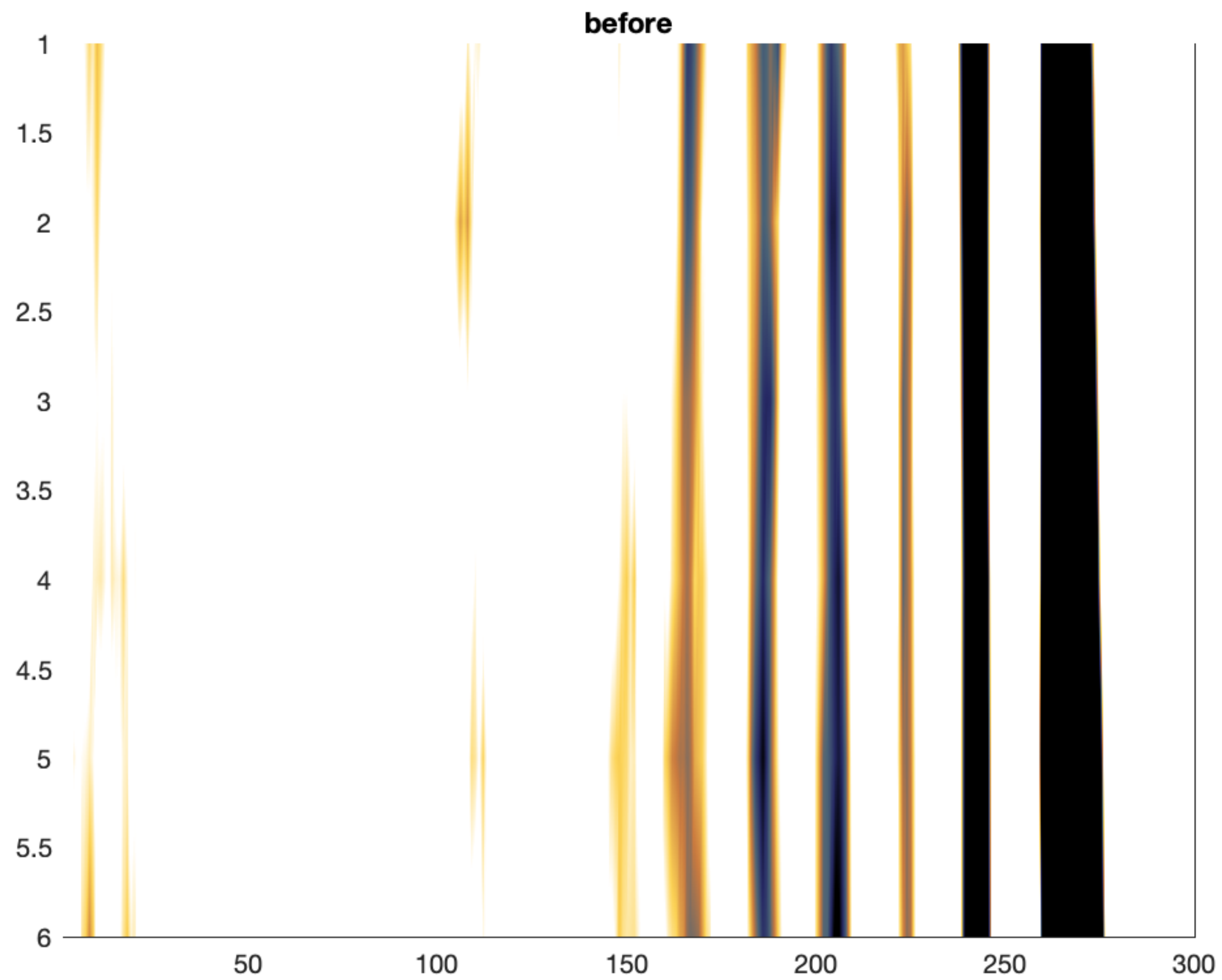
1476.5 cm⁻¹



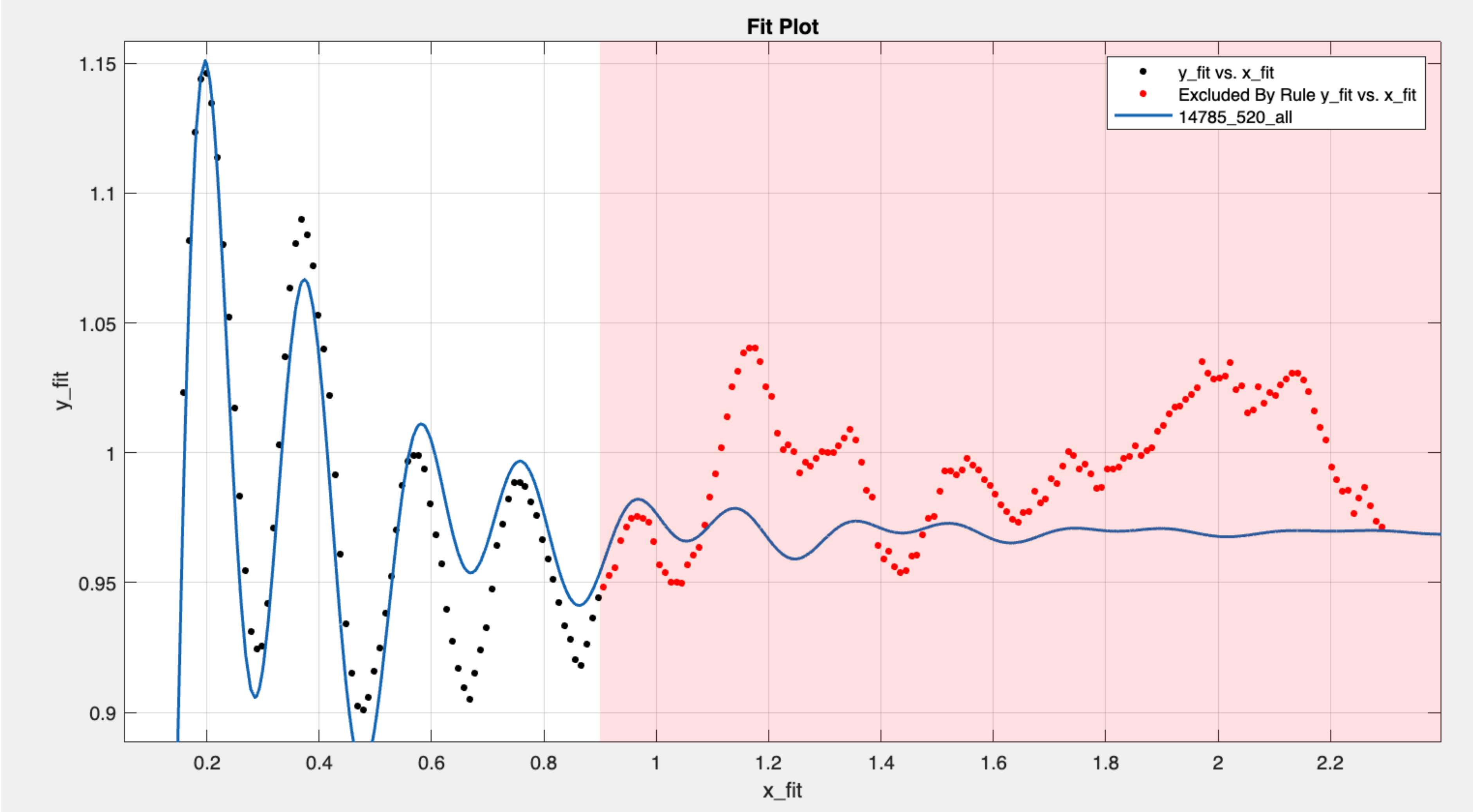


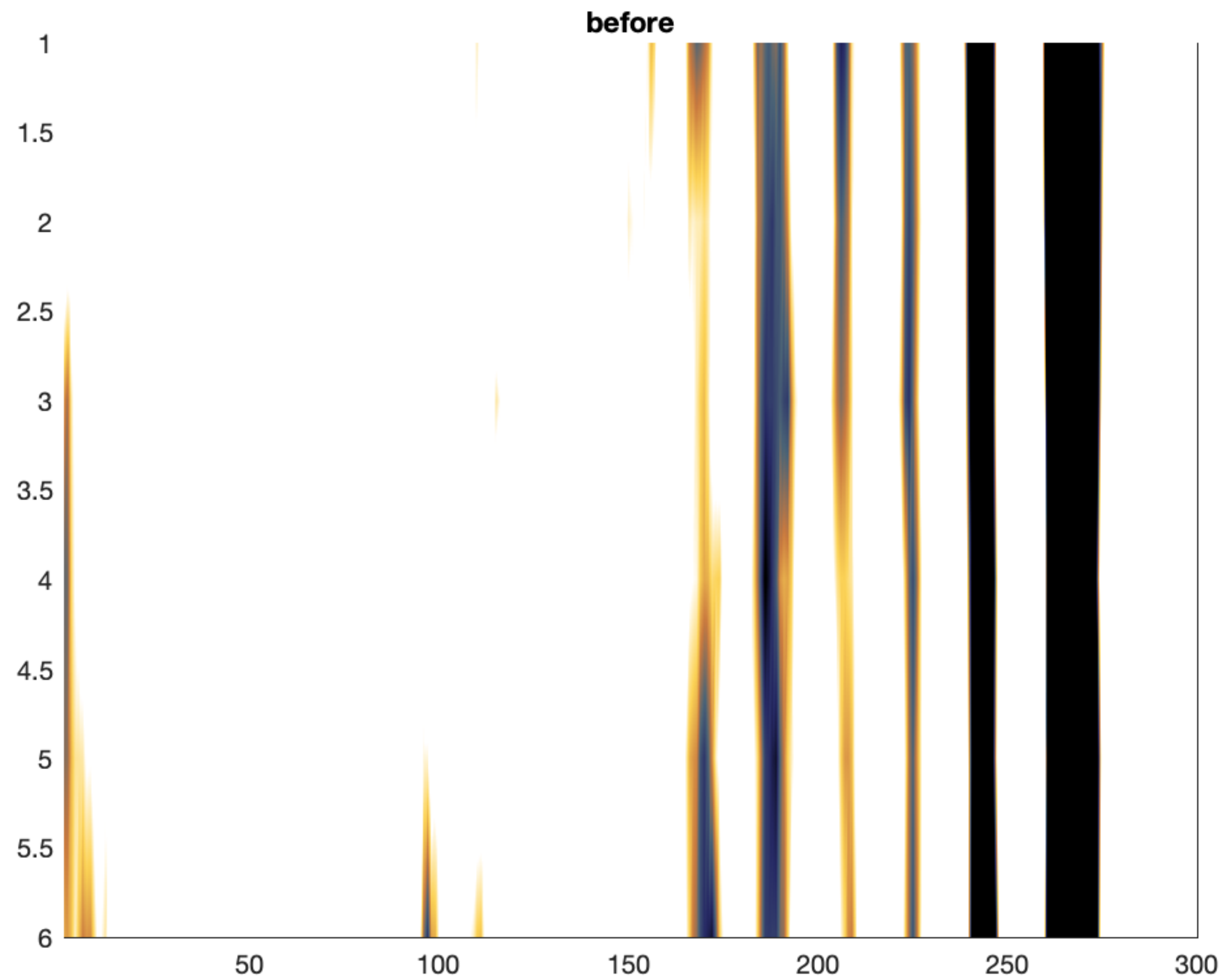
1477.5 cm⁻¹





1478.5 cm⁻¹





1479.5 cm⁻¹

Fit Plot

