Supporting Information

Hydrolysis of Lysozyme with an RF-Powered Micro-Reactor

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1. Experiments run with the same applied head pressures but varied flow rates; in each case, as flow rate was increased, the reactivity decreased.

![Figure 1 SI. HPLC-UV chromatograph of hydrolyzed lysozyme samples at constant head pressure (0.34 MPa) and different flow rates. An increase in the flow rate results in decreased reactivity.](image1)

![Figure 2 SI. HPLC-UV chromatograph of hydrolyzed lysozyme samples at constant head pressure (0.69 MPa) and different flow rates. An increase in the flow rate results in decreased reactivity.](image2)
2. Experiments where the applied head pressures are different but the flow rates are the same; higher pressure experiments yielded more reactivity.

Figure 3 SI. Comparison of HPLC-UV chromatograph for the samples hydrolyzed at a flow rate of 9.8 μL/min

Figure 4 SI. Comparison of HPLC-UV chromatograph for the samples hydrolyzed at fast flow rates.
3. Tis-Tricine SDS-PAGE gels not shown in paper, displaying the RF micro-reactor’s ability to break the peptide backbone.

Figure 5 SI. Sample by lane: 1- Rainbow molecular weight marker; 2- Stock Lysozyme solution (6mM HCl) in reducing buffer; 3- Stock Lysozyme solution (6mM HCl) in non-reducing buffer; 4- Heat and pressure, lysozyme (6mM HCl) solution, 130 °C, 2.07 MPa, 0.92 m flow restrictor, 24 μL/min, ~2.5 inches submerged, in reducing buffer; 5- Stock lysozyme (DI water) in reducing buffer; 6- Stock lysozyme (DI water) in non-reducing buffer.
Figure 6 SI. Sample by lane: 1- Rainbow molecular weight marker; 2- Stock Lysozyme solution (6mM HCl) in reducing buffer; 3- Heat and pressure, lysozyme (6mM HCl) solution, 130 °C, 2.07 MPa, 0.91 m flow restrictor, 24 μL/min, ~2.5 inches submerged, in reducing buffer; 4- Heat and pressure, lysozyme (6mM HCl) solution, 130 °C, 2.07 MPa, 0.91 m flow restrictor, 24 μL/min, ~2.5 inches submerged, in reducing buffer; 5- Stock Lysozyme solution (6mM HCl) in reducing buffer; 6- Rainbow molecular weight marker; 7- Stock Lysozyme solution (6mM HCl) in reducing buffer.
Figure 7 SI. Sample by lane: 1- Rainbow molecular weight marker; 2- RF micro-reactor, lysozyme solution (6mM HCl), 0.34 MPa, 2.5 μL/min, 1.22 m flow restrictor, in reducing buffer; 3- RF micro-reactor, lysozyme solution (6mM HCl), 0.69 MPa, 5.2 μL/min, 1.22 m flow restrictor, in reducing buffer; 4- RF micro-reactor, lysozyme solution (6mM HCl), 1.34 MPa, 9.8 μL/min, 1.22 m flow restrictor, in reducing buffer; 5- RF micro-reactor, lysozyme solution (6mM HCl), 2.07 MPa, 15.6 μL/min, 1.22 m flow restrictor, in reducing buffer; 6- Stock Lysozyme solution (6mM HCl) in reducing buffer.
Figure 8 SI. Sample by lane: 1- Rainbow molecular weight marker; 2- RF micro-reactor, lysozyme solution (6mM HCl), 2.76 MPa, 1.22 m flow restrictor, 19.4 μL/min, in reducing buffer; 3- RF micro-reactor, lysozyme solution (6mM HCl), 0.34 MPa, 0.91 m flow restrictor, 3.4 μL/min, in reducing buffer; 4- RF micro-reactor, lysozyme solution (6mM HCl), 0.69 MPa, 0.91 m flow restrictor, 7.4 μL/min, in reducing buffer; 5- RF micro-reactor, lysozyme solution (6mM HCl), 2.07 MPa, 0.91 m flow restrictor, 18.9 μL/min, in reducing buffer; 6- Stock Lysozyme solution (6mM HCl) in reducing buffer.
Figure 9 SI. Sample by lane: 1- Rainbow molecular weight marker; 2- RF micro-reactor, lysozyme solution (6mM HCl), 0.34 MPa, 0.30 m flow restrictor, 11.4 μL/min, in reducing buffer; 3- RF micro-reactor, lysozyme solution (6mM HCl), 0.69 MPa, 0.30 m flow restrictor, 20.2 μL/min, in reducing buffer; 4- RF micro-reactor, lysozyme solution (6mM HCl), 1.38 MPa, 0.30 m flow restrictor, 56.4 μL/min, in reducing buffer; 5- RF micro-reactor, lysozyme solution (6mM HCl), 2.07 MPa, 0.30 m flow restrictor, 70.0 μL/min, in reducing buffer; 6- Stock Lysozyme solution (6mM HCl) in reducing buffer.
Figure 10 SI. Sample by lane: 1- Rainbow molecular weight marker; 2- RF micro-reactor, lysozyme solution (6mM HCl), 2.76 MPa, 0.30 m flow restrictor, 77.6 μL/min, in reducing buffer; 3- RF micro-reactor, lysozyme solution (6mM HCl), 0.34 MPa, 0.61 m flow restrictor, 5.9 μL/min, in reducing buffer; 4- RF micro-reactor, lysozyme solution (6mM HCl), 0.69 MPa, 0.61 m flow restrictor, 10.2 μL/min, in reducing buffer; 5- RF micro-reactor, lysozyme solution (6mM HCl), 2.07 MPa, 0.61 m flow restrictor, 31.7 μL/min, in reducing buffer; 6- Stock Lysozyme solution (6mM HCl) in reducing buffer.
Figure 11 SI. Sample by lane: 1- Rainbow molecular weight marker; 2- Heat and pressure, lysozyme (6mM HCl) solution, 130 °C, 0.69 MPa, 0.91 m flow restrictor, 6.9 μL/min, ~2.5 inches submerged, in reducing buffer; 3- Heat and pressure, lysozyme (6mM HCl) solution, 130 °C, 1.38 MPa, 0.91 m flow restrictor, 19.0 μL/min, ~2.5 inches submerged, in reducing buffer; 4- Heat and pressure, lysozyme (6mM HCl) solution, 130 °C, 2.07 MPa, 0.91 m flow restrictor, 20.8 μL/min, ~2.5 inches submerged, in reducing buffer; 5- Heat and pressure, lysozyme (6mM HCl) solution, 130 °C, 2.76 MPa, 0.91 m flow restrictor, 24.4 μL/min, ~2.5 inches submerged, in reducing buffer; 6- Stock Lysozyme solution (6mM HCl) in reducing buffer; 7- RF micro-reactor, lysozyme solution (6mM HCl), 1.39 MPa, 1.22 m flow restrictor, 9.8 μL/min, in reducing buffer.
4. Heat and pressure control experiments (without RF)

![Figure 12 SI. Samples of lysozyme in 6mM HCl run with 2.5 cm of Teflon tubing submerged in a 105 °C oil bath.](image)

Figure 12 SI. Samples of lysozyme in 6mM HCl run with 2.5 cm of Teflon tubing submerged in a 105 °C oil bath.
Figure 13 SI. Samples of lysozyme in 6mM HCl run with 2.5 cm of Teflon tubing submerged in a 115 °C oil bath.

Figure 14 SI. Samples of lysozyme in 6mM HCl run with 4 cm of Teflon tubing submerged in a 115 °C oil bath.
Figure 15 SI. Heat and pressure experiments run at 150 °C using stainless steel tubing and covered with a heated 2.5 cm copper block.
Figure 16 SI. Heat and pressure experiments run at 250 °C using stainless steel tubing and covered with a heated 2.5 cm copper block.

Figure 17 SI. Heat and pressure experiments run at 350 °C using stainless steel tubing and covered with a heated 2.5 cm copper block.
5. Temperature measurements inside waveguide

<table>
<thead>
<tr>
<th>Applied pressure (boiling point of water at given pressure)</th>
<th>Temperature measured*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.34 MPa (138 °C)</td>
<td>167-169 °C</td>
</tr>
<tr>
<td>0.69 MPa (164 °C)</td>
<td>182-184 °C</td>
</tr>
<tr>
<td>1.38 MPa (194 °C)</td>
<td>199-203 °C</td>
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</tbody>
</table>

*Range of temperatures measured over a period of approximately 30 seconds