

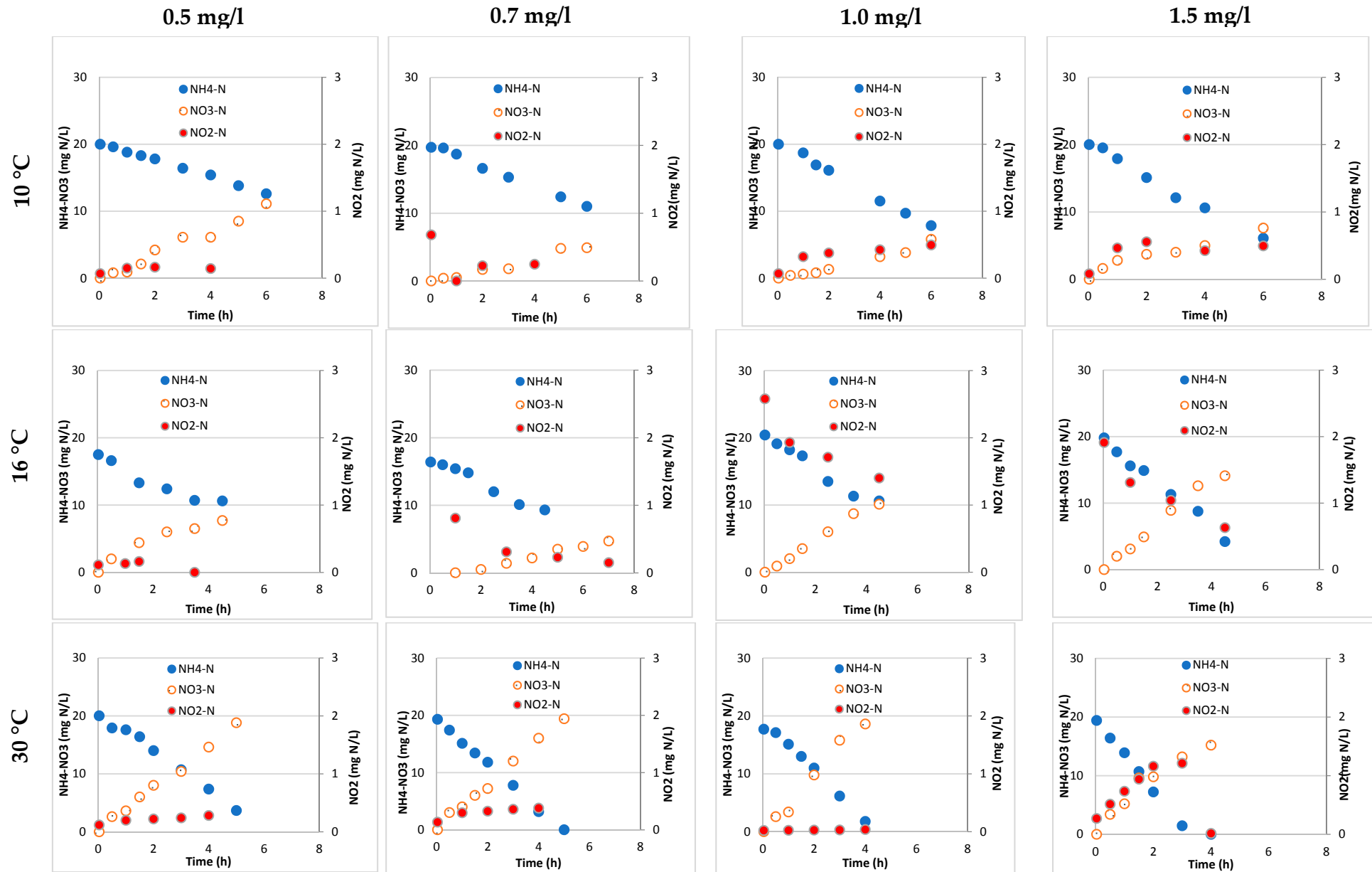
# **SUPPLEMENTARY MATERIALS for “Mutual Interaction Between Temperature and DO Set Point on AOB and NOB Activity During Shortcut Nitrification in a Sequencing Batch Reactor in Terms of Energy Consumption Optimization”**

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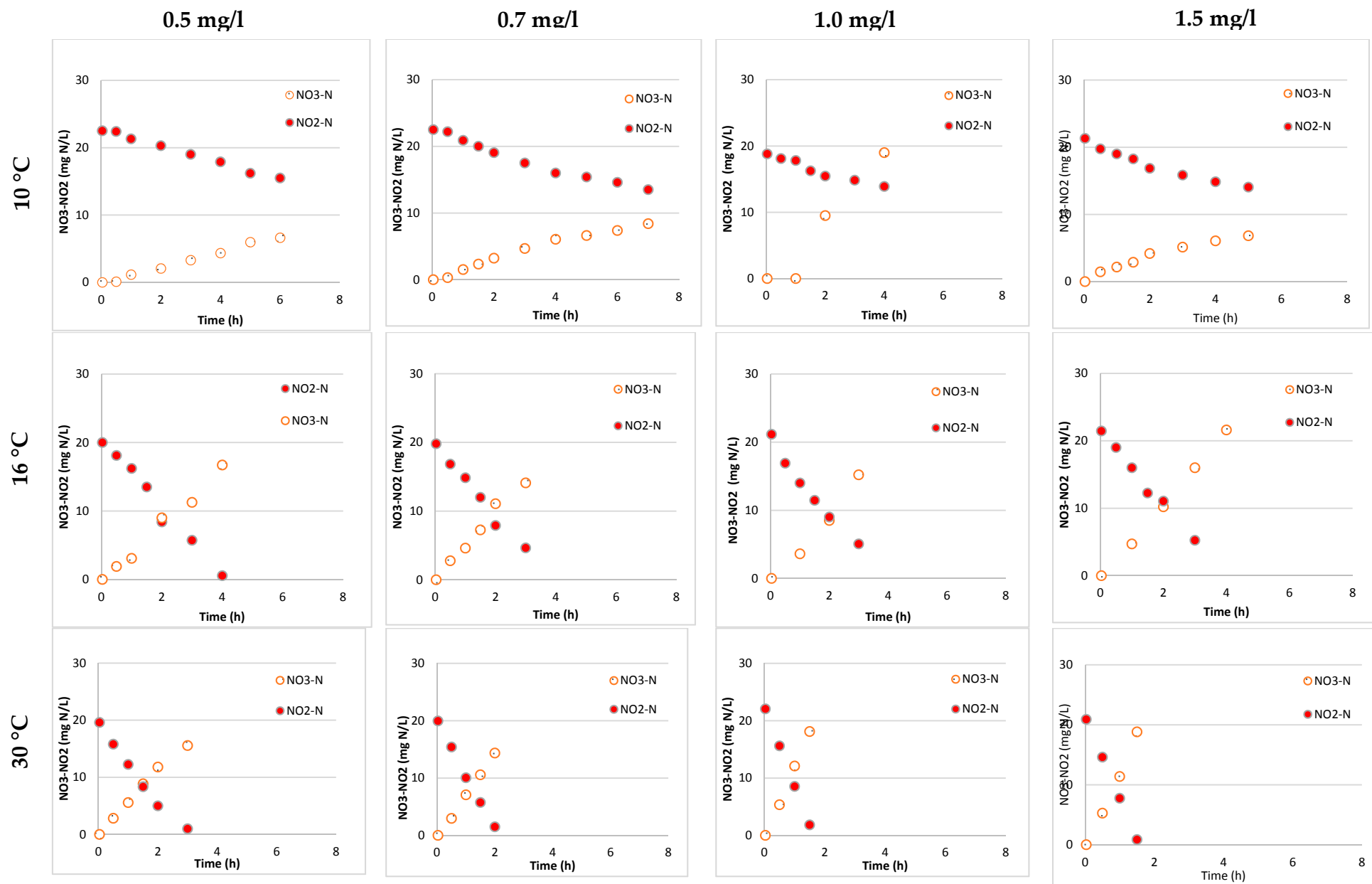
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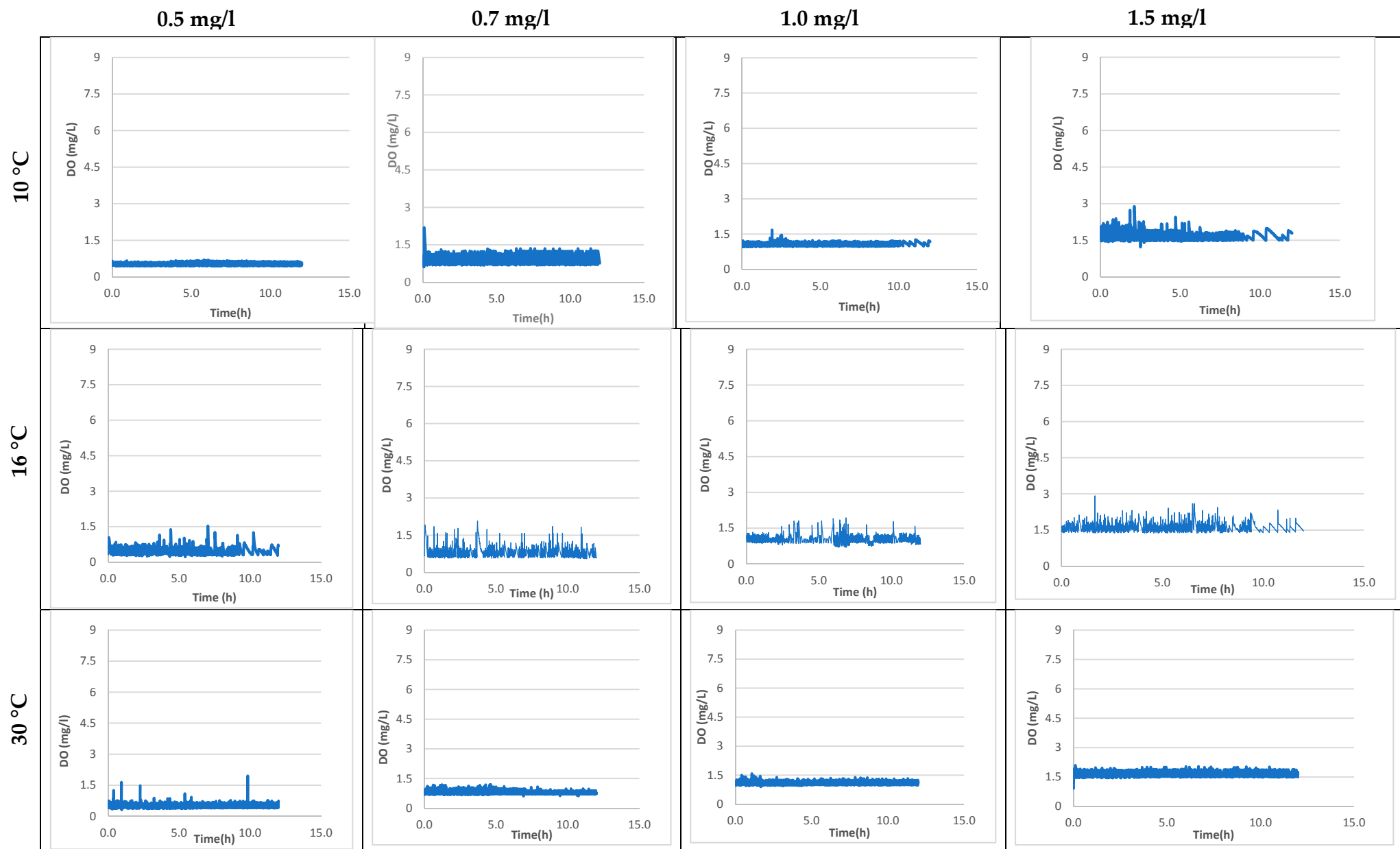
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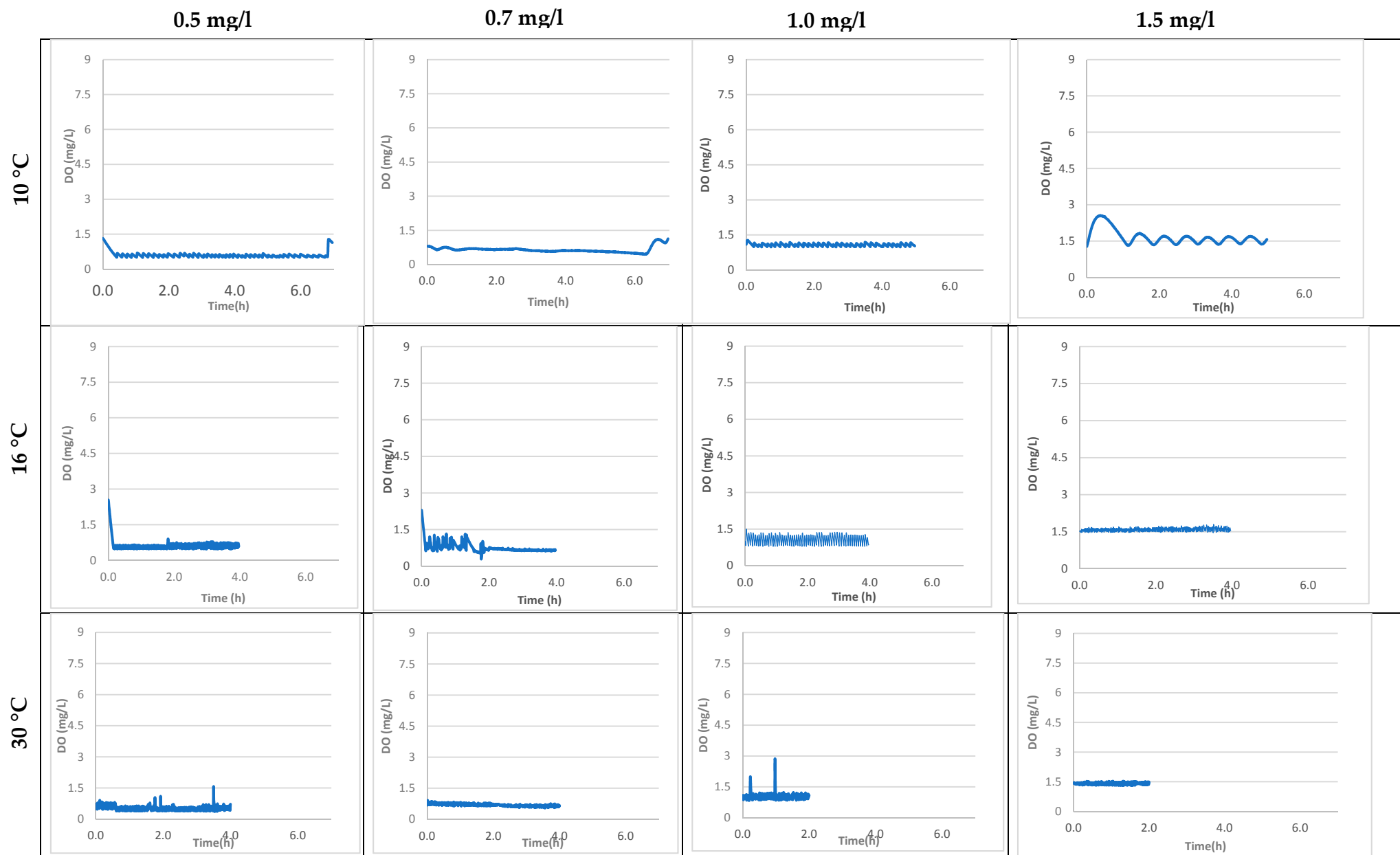
**Figure S1.** AUR and NPR under various combination of the temperature and dissolved DO set point, during batch tests with ammonium as a nitrogen source.



**Figure S2.** NiUR and NPR under various combination of the temperature and dissolved DO set point, during batch tests with nitrite as a nitrogen source.



**Figure S3.** DO profiles in the reactors during batch tests with ammonium as a nitrogen source under various temperatures and DO set points.



**Figure S4.** DO profiles in the reactors during batch tests with nitrite as a nitrogen source under various temperatures and DO set points.

**Table S1.** Averaged DO concentrations during batch tests with ammonium as a nitrogen source under various temperatures and DO set points.

| Test 1 | Temperature (°C)           | 10            |               |               |               | 16            |               |               |               | 30            |               |                       |               |
|--------|----------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-----------------------|---------------|
|        | DO setpoint(mg/l)          | 0.5           | 0.7           | 1             | 1.5           | 0.5           | 0.7           | 1             | 1.5           | 0.5           | 0.7           | 1                     | 1.5           |
|        | DO (Actual/Average) (mg/l) | 0.54±<br>0.06 | 0.79±<br>0.19 | 1.09±<br>0.07 | 1.72±<br>0.18 | 0.50±<br>0.16 | 0.82±<br>0.14 | 1.07±<br>0.18 | 1.62±<br>0.19 | 0.53±<br>0.11 | 0.81±<br>0.10 | <b>1.12±<br/>0.09</b> | 1.68±<br>0.13 |

**Table S2.** Averaged DO concentrations during batch tests with ammonium as a nitrogen source under various temperatures and DO set points.

| Test 2 | Temperature (°C)           | 10            |                       |               |               | 16            |               |               |               | 30            |               |               |               |
|--------|----------------------------|---------------|-----------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
|        | DO setpoint(mg/l)          | 0.5           | 0.7                   | 1             | 1.5           | 0.5           | 0.7           | 1             | 1.5           | 0.5           | 0.7           | 1             | 1.5           |
|        | DO (Actual/Average) (mg/l) | 0.60±<br>0.14 | <b>0.65±<br/>0.12</b> | 1.08±<br>0.05 | 1.72±<br>0.18 | 0.63±<br>0.13 | 0.76±<br>0.12 | 1.06±<br>0.17 | 1.59±<br>0.07 | 0.53±<br>0.11 | 0.69±<br>0.07 | 1.04±<br>0.14 | 1.41±<br>0.06 |

**Table S3.** Identification of the most energy efficient conditions in terms of AOB and NOB activity under various temperatures and DO set points.

| Process temp. | DO<br>(mgO <sub>2</sub> /L) | Total energy demand<br>(watt) | Total energy demand<br>(watt) | Share of the NOB activity in the total energy consumption | Share of the NOB activity in the total energy consumption<br>(averaged ± SD) |
|---------------|-----------------------------|-------------------------------|-------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------|
|               |                             | Series 1                      | Series 2                      |                                                           |                                                                              |
| 10°C          | 0.5                         | 1.19                          | 0.29                          | 24.4%                                                     | 25.3% ± 3.1%                                                                 |
|               | 0.7                         | 1.01                          | 0.29                          | 28.7%                                                     |                                                                              |
|               | 1                           | 1.09                          | 0.29                          | 26.6%                                                     |                                                                              |
|               | 1.5                         | 1.31                          | 0.28                          | 21.4%                                                     |                                                                              |
| 16°C          | 0.5                         | 2.41                          | 0.57                          | 23.7%                                                     | 20.2% ± 2.8%                                                                 |
|               | 0.7                         | 3.33                          | 0.57                          | 17.1%                                                     |                                                                              |
|               | 1                           | 2.93                          | 0.55                          | 18.8%                                                     |                                                                              |
|               | 1.5                         | 2.65                          | 0.56                          | 21.1%                                                     |                                                                              |
| 30°C          | 0.5                         | 1.73                          | 0.6                           | 34.7%                                                     | 25.8% ± 6.4%                                                                 |
|               | 0.7                         | 1.62                          | 0.41                          | 25.3%                                                     |                                                                              |
|               | 1                           | 1.44                          | 0.28                          | 19.4%                                                     |                                                                              |
|               | 1.5                         | 1.18                          | 0.28                          | 23.7%                                                     |                                                                              |