

Supplementary Information

1. Test data of CO₂ fixation efficiency of *Chlorella* PY-ZU1 under 15% CO₂

| cultivation time (Hour) | CO ₂ fixation efficiency | | |
|----------------------------|--|------------|-----------------|
| | with nitrate from 500ppm NO oxidation | without NO | with 500 ppm NO |
| 0 | 96.80 | 75.54 | 57.84 |
| 0.5 | 92.80 | 81.46 | 77.04 |
| 1.5 | 86.67 | 80.16 | 59.38 |
| 2 | 77.87 | 67.79 | 37.26 |
| 3 | 69.40 | 36.96 | 13.97 |
| 4 | 66.60 | 22.77 | 9.26 |
| 5 | 65.73 | 19.84 | 9.39 |
| 6 | 54.93 | 20.23 | 10.60 |
| 7 | 46.80 | 21.80 | 12.33 |
| 8 | 37.00 | 23.16 | 14.27 |
| 9 | 39.80 | 24.59 | 15.61 |
| 10 | 49.67 | 26.09 | 16.82 |
| 11 | 51.87 | 26.68 | 18.22 |
| 12 | 52.87 | 27.07 | 19.91 |
| 13 | 53.73 | 27.00 | 21.25 |
| 14 | 54.53 | 26.61 | 22.24 |
| 15 | 55.53 | 26.09 | 23.36 |
| 16 | 55.80 | 26.28 | 23.99 |
| 17 | 55.87 | 27.20 | 24.22 |
| 18 | 58.20 | 27.59 | 24.44 |
| 19 | 62.60 | 27.46 | 24.80 |
| 20 | 65.27 | 27.72 | 25.13 |
| 21 | 66.93 | 28.76 | 25.78 |
| 22 | 68.33 | 29.86 | 26.92 |
| 23 | 68.87 | 30.97 | 26.94 |
| 24 | 69.07 | 31.23 | 26.25 |
| 25 | 69.27 | 32.33 | 26.26 |
| 26 | 69.00 | 32.20 | 26.13 |
| 27 | 69.53 | 32.60 | 26.23 |
| 28 | 69.60 | 32.87 | 26.18 |
| 29 | 69.40 | 33.07 | 26.10 |
| 30 | 67.87 | 33.00 | 26.08 |
| 31 | 67.80 | 32.93 | 26.11 |
| 32 | 67.53 | 32.73 | 26.34 |
| 33 | 67.33 | 32.73 | 26.36 |

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| 34 | 66.93 | 32.53 | 25.86 |
| 35 | 66.67 | 32.27 | 25.20 |
| 36 | 66.67 | 31.53 | 25.12 |
| 37 | 66.80 | 30.47 | 25.07 |
| 38 | 67.67 | 29.67 | 24.95 |
| 39 | 67.27 | 29.13 | 24.58 |
| 40 | 66.87 | 28.87 | 24.80 |
| 41 | 66.73 | 28.53 | 24.27 |
| 42 | 64.60 | 27.87 | 23.37 |
| 43 | 65.20 | 27.13 | 22.19 |
| 44 | 65.27 | 25.87 | 20.52 |
| 45 | 64.80 | 26.20 | 19.84 |
| 46 | 64.80 | 26.07 | 19.75 |
| 47 | 64.60 | 26.33 | 19.92 |
| 48 | 65.00 | 26.13 | 20.00 |
| 49 | 64.67 | 39.13 | 19.84 |
| 50 | 65.00 | 28.07 | 19.84 |
| 51 | 66.07 | 24.93 | 20.08 |
| 52 | 65.80 | 24.67 | 19.96 |
| 53 | 65.67 | 24.87 | 20.31 |
| 54 | 65.67 | 24.93 | 20.27 |
| 55 | 65.73 | 24.73 | 20.35 |
| 56 | 65.47 | 24.47 | 20.48 |
| 57 | 65.40 | 24.00 | 19.91 |
| 58 | 65.27 | 23.40 | 19.85 |
| 59 | 64.60 | 22.87 | 19.65 |
| 60 | 64.53 | 22.20 | 18.85 |
| 61 | 64.40 | 21.73 | 18.42 |
| 62 | 64.53 | 20.87 | 18.20 |
| 63 | 64.20 | 20.60 | 17.81 |
| 64 | 63.87 | 19.27 | 17.66 |
| 65 | 63.67 | 19.33 | 17.26 |
| 66 | 63.20 | 19.80 | 16.83 |
| 67 | 63.20 | 19.40 | 16.45 |
| 68 | 62.60 | 19.47 | 16.19 |
| 69 | 62.87 | 19.27 | 15.88 |
| 70 | 62.60 | 18.80 | 15.29 |
| 71 | 62.60 | 18.73 | 14.96 |
| 72 | 62.93 | 18.73 | 14.85 |
| 73 | 62.53 | 18.80 | 14.72 |
| 74 | 61.93 | 31.53 | 14.74 |
| 75 | 62.27 | 21.13 | 14.66 |

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| 76 | 62.27 | 18.33 | 14.91 |
| 77 | 61.40 | 18.47 | 13.83 |
| 78 | 61.27 | 18.47 | 13.05 |
| 79 | 60.40 | 18.53 | 12.63 |
| 80 | 60.07 | 18.40 | 12.37 |
| 81 | 59.93 | 18.20 | 12.19 |
| 82 | 59.47 | 17.80 | 12.07 |
| 83 | 58.93 | 17.40 | 11.81 |
| 84 | 58.20 | 17.07 | 11.63 |
| 85 | 57.87 | 16.40 | 11.30 |
| 86 | 57.73 | 15.80 | 11.24 |
| 87 | 57.60 | 15.33 | 10.92 |
| 88 | 56.80 | 14.67 | 10.59 |
| 89 | 56.67 | 14.53 | 10.16 |
| 90 | 55.67 | 14.93 | 9.56 |
| 91 | 54.80 | 15.00 | 9.08 |
| 92 | 54.33 | 14.20 | 8.54 |
| 93 | 55.00 | 13.80 | 8.01 |
| 94 | 55.60 | 13.40 | 8.27 |
| 95 | 55.87 | 13.80 | 8.00 |
| 96 | 55.67 | 13.73 | 8.08 |
| 97 | 55.87 | 44.53 | 8.22 |
| 98 | 55.73 | 23.53 | 7.96 |
| 99 | 55.20 | 14.80 | 8.11 |
| 100 | 53.27 | 12.93 | 8.24 |
| 101 | 53.73 | 13.00 | 8.71 |
| 102 | 53.67 | 13.47 | 8.12 |
| 103 | 53.60 | 13.53 | 7.99 |
| 104 | 53.20 | 13.47 | 7.64 |
| 105 | 53.00 | 13.67 | 7.37 |
| 106 | 52.60 | 13.67 | 7.02 |
| 107 | 52.47 | 13.33 | 6.82 |
| 108 | 51.93 | 13.07 | 6.75 |
| 109 | 51.80 | 12.80 | 6.48 |
| 110 | 51.60 | 12.53 | 5.95 |
| 111 | 50.93 | 12.60 | 5.83 |
| 112 | 50.60 | 12.07 | 5.50 |
| 113 | 50.40 | 12.33 | 5.04 |
| 114 | 48.67 | 12.67 | 4.65 |
| 115 | 48.53 | 12.87 | 4.52 |
| 116 | 48.80 | 12.80 | 3.92 |
| 117 | 47.80 | 12.73 | 3.26 |

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| 118 | 47.67 | 12.67 | 3.93 |
| 119 | 47.13 | 12.80 | 4.45 |
| 120 | 46.67 | 12.80 | 4.64 |
| 121 | 46.20 | 12.47 | 5.57 |
| 122 | 45.73 | 26.13 | 4.83 |
| 123 | 45.60 | 14.27 | 4.90 |
| 124 | 43.67 | 11.40 | 4.89 |
| 125 | 44.73 | 11.27 | 5.09 |
| 126 | 44.73 | 11.60 | 4.84 |
| 127 | 45.40 | 11.67 | 4.44 |
| 128 | 45.47 | 11.33 | 4.25 |
| 129 | 45.73 | 11.20 | 4.19 |
| 130 | 45.27 | 11.20 | 3.72 |
| 131 | 44.60 | 10.87 | 3.59 |
| 132 | 44.33 | 10.40 | 3.33 |
| 133 | 44.20 | 9.80 | 3.26 |
| 134 | 43.87 | 9.20 | 2.92 |
| 135 | 43.93 | 8.80 | 2.59 |
| 136 | 43.80 | 8.07 | 2.32 |
| 137 | 43.13 | 7.93 | 1.92 |
| 138 | 43.27 | 8.33 | 1.46 |
| 139 | 43.33 | 8.00 | 1.06 |
| 140 | 42.60 | 7.93 | 0.73 |
| 141 | 42.53 | 7.93 | 0.20 |
| 142 | 42.73 | 8.00 | 0.20 |
| 143 | 42.33 | 7.47 | 1.26 |
| 144 | 42.47 | 6.80 | 1.99 |
| 145 | 42.53 | 11.07 | 1.46 |
| 146 | 42.40 | 6.53 | |
| 147 | 41.87 | 5.60 | |
| 148 | 41.80 | 5.93 | |
| 149 | 41.87 | 5.53 | |
| 150 | 40.93 | 5.80 | |
| 151 | 41.53 | 5.47 | |
| 152 | 41.67 | 5.20 | |
| 153 | 42.27 | 5.07 | |
| 154 | 42.33 | 5.07 | |
| 155 | 41.87 | 4.27 | |
| 156 | 41.73 | 4.13 | |
| 157 | 40.93 | 3.47 | |
| 158 | 40.07 | 3.07 | |
| 159 | 40.27 | 2.80 | |

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|-----|-------|------|--|
| 160 | 39.73 | 2.60 | |
| 161 | 38.80 | 3.40 | |
| 162 | 38.67 | 3.20 | |
| 163 | 38.53 | 3.47 | |
| 164 | 37.87 | 2.80 | |
| 165 | 37.53 | 2.47 | |
| 166 | 37.67 | 2.60 | |
| 167 | 37.27 | 3.13 | |
| 168 | 37.73 | 3.33 | |
| 169 | 37.27 | 6.67 | |
| 170 | 37.40 | 3.53 | |

2. Mean value of experimental data and standard errors of CO₂ fixation efficiency of *Chlorella* PY-ZU1 under 15% CO₂

| cultivation time (Hour) | CO ₂ fixation efficiency | | | | | |
|----------------------------|--|------|------------|------|-----------------|-------|
| | with nitrate from 500ppm NO oxidation | | without NO | | with 500 ppm NO | |
| | Mean | SD | Mean | SD | Mean | SD |
| 1 | 86.67 | 2.17 | 81.46 | 2.40 | 59.38 | 10.67 |
| 3 | 69.40 | 1.34 | 36.96 | 1.09 | 37.26 | 0.74 |
| 11 | 51.87 | 1.76 | 25.28 | 0.74 | 18.22 | 1.54 |
| 20 | 65.27 | 2.43 | 29.29 | 0.86 | 25.13 | 1.13 |
| 28 | 69.60 | 2.21 | 32.73 | 1.88 | 26.18 | 0.55 |
| 40 | 66.87 | 1.48 | 28.98 | 1.14 | 24.80 | 1.02 |
| 59 | 64.60 | 2.17 | 22.59 | 0.89 | 19.65 | 1.02 |
| 72 | 62.93 | 1.76 | 18.78 | 0.84 | 14.85 | 0.94 |
| 96 | 55.67 | 1.44 | 13.63 | 0.55 | 8.08 | 0.65 |
| 120 | 46.67 | 1.36 | 12.30 | 0.14 | 4.64 | 0.70 |
| 144 | 42.47 | 1.58 | 6.74 | 0.09 | 1.99 | 0.38 |
| 168 | 37.73 | 1.45 | 2.46 | 0.03 | | |