

Supplementary Table 1 The significant levels (*p* values) in comparison of the specific growth rates of *Synechococcus* WH7803 among the different growth light levels.

		Irradiance ($\mu\text{mol m}^{-2} \text{s}^{-1}$)					
		6	13	25	38	50	100
Light ($\mu\text{mol m}^{-2} \text{s}^{-1}$)	6	/	0.006	0.000	0.006	0.012	0.201
	13	0.006	/	0.515	1.000	0.998	0.344
	25	0.000	0.515	/	0.544	0.309	0.021
	38	0.006	1.000	0.544	/	0.996	0.321
	50	0.012	0.998	0.309	0.996	/	0.560
	100	0.201	0.344	0.021	0.321	0.560	/

Supplementary Table 2 The significant levels (*p* values) in comparison of chlorophyll *a* fluorescence parameters of *Synechococcus* WH7803 among the different growth light levels.

		Irradiance ($\mu\text{mol m}^{-2} \text{s}^{-1}$)					
Parameters		6	13	25	38	50	100
Φ_{PSII}	6	/	0.997	1.000	1.000	0.833	0.420
	13	0.997	/	0.975	0.974	0.592	0.231
	25	1.000	0.975	/	1.000	0.937	0.574
	38	1.000	0.974	1.000	/	0.938	0.577
	50	0.833	0.592	0.937	0.938	/	0.969
	100	0.420	0.231	0.574	0.577	0.969	/

Supplementary Table 3 The significant levels (*p* values) for the specific growth rate ratios of HC to LC treatment in *Synechococcus* WH7803 under the optimal, limitative and inhibitory intensity, respectively

Irradiance	Ratio of HC to			
	LC (n = 9)	LI	OI	II
LI	1.024 ± 0.007	/	0.001	0.936
OI	1.001 ± 0.002	0.001	/	0.002
II	1.022 ± 0.019	0.936	0.002	/

Supplementary Table 4 The significant levels (*p* values) for the parameters of chlorophyll a fluorescence in *Synechococcus* WH7803 under the optimal, limitative and inhibitory intensity, respectively.

Parameters	Irradiance ($\mu\text{mol m}^{-2} \text{s}^{-1}$)	Ratio of HC to			
		LC (n = 9)	6	25	100
Φ_{PSII} after light-adaption	6	1.008 ± 0.161	/	0.821	0.004
	25	1.070 ± 0.051	0.821	/	0.017
	100	1.374 ± 0.335	0.004	0.017	/
$rETR_m$ ($\mu\text{mol e m}^{-2} \text{s}^{-1}$)	6	1.017 ± 0.044	/	0.001	0.000
	25	1.107 ± 0.026	0.001	/	0.000
	100	1.208 ± 0.059	0.000	0.000	/

Supplementary Table 5 The significant levels (*p* values) the pigments concentrations per cell in *Synechococcus* WH7803 grown under HC and LC and the 3 different PAR levels

Pigments		HC			LC			Between
		Irradiance ($\mu\text{mol m}^{-2} \text{ s}^{-1}$)			Irradiance ($\mu\text{mol m}^{-2} \text{ s}^{-1}$)			HC and
		6	25	100	6	25	100	LC
Chl <i>a</i>	6	/	0.000	0.000	/	0.000	0.107	0.004
	25	0.000	/	0.000	0.000	/	0.002	0.001
	100	0.000	0.000	/	0.002	0.107	/	0.000
CARs	6	/	0.000	0.000	/	0.000	0.008	0.001
	25	0.000	/	0.000	0.000	/	0.032	0.002
	100	0.000	0.000	/	0.008	0.032	/	0.000
APC	6	/	0.011	0.000	/	0.107	0.843	0.000
	25	0.011	/	0.005	0.107	/	0.220	0.036
	100	0.000	0.005	/	0.843	0.220	/	0.001
PC	6	/	0.006	0.000	/	0.710	0.854	0.001
	25	0.006	/	0.005	0.710	/	0.961	0.010
	100	0.000	0.005	/	0.854	0.961	/	0.001
PE	6	/	0.008	0.000	/	0.186	0.964	0.001
	25	0.008	/	0.009	0.186	/	0.134	0.005
	100	0.000	0.009	/	0.964	0.134	/	0.001