

# Development of a Ground-based Experimental Facility for Space Micro-algae Photo-Bioreactor

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To develop a ground-based experimental facility for space micro-algal photo-bioreactor, which produce algae and oxygen for astronaut, and reduce carbon dioxide, in closed-ecology life support system, meanwhile. **Method:** Based on technical parameters and performance requirements, project planning, design drawing, fabrication, and debug were conducted. Finally, an experimental test for producing algae was done. Its productivity for micro-algae was evaluated. **Result:** The facility worked well, and the parameters, such as energy consumption, volume, and productivity for algae, met the design requirement. The experimental test results demonstrated that the density of algae in the photo-bioreactor increased from  $0.174 \text{ g (DW)·L}^{-1}$  to  $4.064 \text{ g (DW)·L}^{-1}$ , after 7 days growing. Its productivity for the micro-algae was up to  $11.1 \text{ g(DW)·d}^{-1}$ . The bioreactor of providing  $\text{CO}_2$  for algae and taking  $\text{O}_2$  from the culture medium adopt a new technique, this is membrane. The principle of it was suitable for the demand of space conditions. **Conclusion:** The facility has reasonable technical indices, and smooth and dependable performances. Its major working principle is fit for the demand of space micro-gravity conditions.