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TECHNOLOGY DESCRIPTION

The photobioreactor (PBR) is a hybrid life-support system which combines a physical-chemical air recycling system (Advanced Closed-Loop System, ACLS) with a biological one.

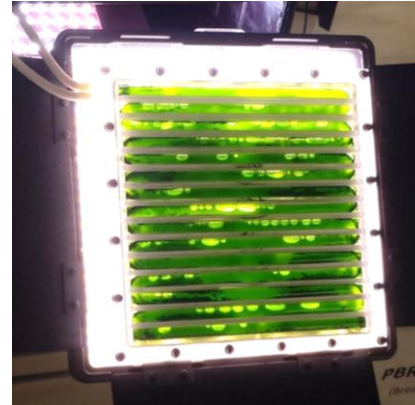
The ACLS converts most of the carbon dioxide (CO2) filtered from inside a cabin (e.g. the air inside the International Space Station) into oxygen (O2). The biological system on the other hand works with the excess CO2 and makes it available to microalgae, which produce oxygen via photosynthesis. The combined approach increases the global efficiency of the system while enabling the production of edible biomass.



INNOVATIVE ASPECTS

Conventional life-support systems rely on physical-chemical processes and depend on refilling and regular deliveries to maintain their functionality. In contrast to this, the PBR is the first hybrid life-support system with a closed resource cycle. This approach is a further step towards the reduction of replenishment in space, and it should contribute to long-term exploration missions. On Earth, the technology offers significant potential in applications such as

- air treatment in confined spaces (e.g. submarines),
- use of microalgae to reduce CO2 emissions and
- food production.



TECHNOLOGY READINESS (in space application)

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COUNTRY OF ORIGIN

Germany

LATEST UPDATE

06/2024

TAGS #hybrid #photobioreactor #carbon dioxide #life support #closed cycle #microalgae

APPLICATION AREAS

Aviation Health Environment - Wildlife & Natu. Resources Food & Agriculture Chemical Engineering & Biotechnology Infrastructure & Smart Cities Space technologies

TECH CARD

