

AquaClean

Title of the Technology: Bacterial Biofilm Based Ammoniacal Wastewater Treatment

Intellectual Property associated: A process and system for ammonia removal from wastewater.

Application Number and Date of filing: 202131002964 dated 21st January 2021

Inventor: Shaon Ray Chaudhuri

Categories of this invention: Ammonia containing Wastewater Treatment.

Innovation: This technology consists of a stable, sludge free bacterial biofilm based process for removing ammonia, nitrate and nitrite from different types of waste water. The hydraulic retention time is based on the initial pollutant load. The system with sustained performance and minimal maintenance (if run as per standard operating procedure) can be used for aquaculture, food industry as well as refinery effluent treatment. The biofilm system remains stable if run as per for years before requirement for replacement/maintenance. Moreover, it can be effectively used as a self-cleaning system in aquaria and ensures that the water does not need to be replaced despite normal fish feed addition.

Problems addressed

Aquaculture industry uses $\sim 17\text{m}^3$ of water per kg of fish production. It also generates large volume of effluent. There is a need to treat the effluent and also replacement the same in the aquaculture practice with fresh water. Sustaining this practice while ensuring environmental safety is of utmost importance for the industry. Currently, the treatment of water is cost intensive and availability of fresh water is scares. The existing treatment technology takes between 1 to 14 days of treatment. The aquarium water needs to be changed every 10 to 15 days in absence of which algal growth appears on the walls. This technology provides an innovative and environmental-friendly alternative to adequately treat the water and reuse the same, avoiding the need for fresh water replacement.

Applications in the field

This technology can be applied to the field of aquaculture waste water treatment, refinery waste water treatment and can also be used by ornamental fish industries that manufacture, sell and maintain aquaria for personal use and in public areas. It would save water and therefore makes it suitable for reuse in aquaculture/suitable for discharge (in refinery).

Advantages

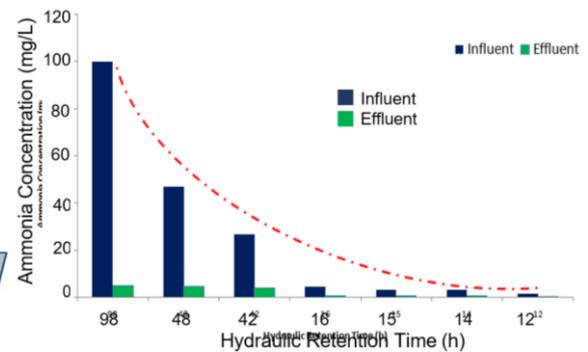
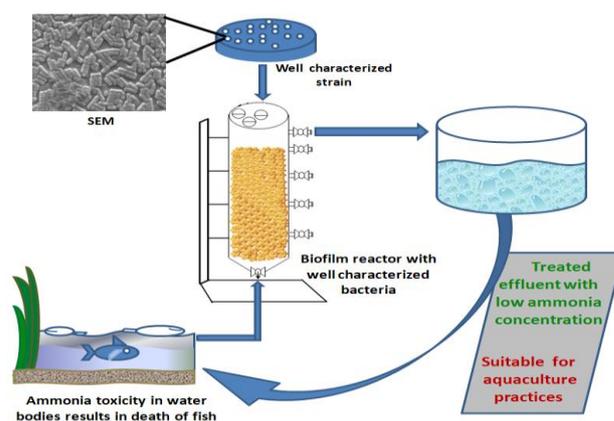
- Sludge free system
- Stable for years if run as per SOP •
- Needs one-time bacterial inoculation

Till date the fastest aquaculture wastewater treatment system using microbes from environmental origin.

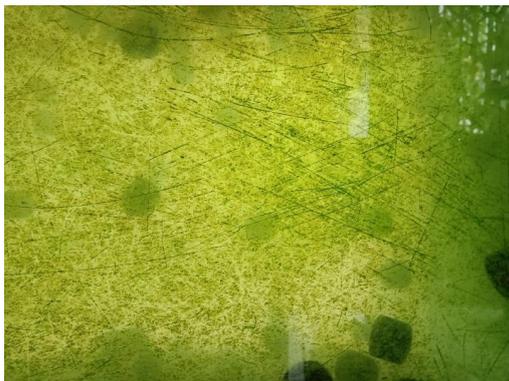
Publications to the Tech if any

1. Mandakini Gogoi, Indranil Mukherjee, **Shaon Ray Chaudhuri**. 2021. Characterization of ammonia remover *Bacillus albus* (ASSF01) in terms of biofilm formation ability with application in aquaculture effluent treatment. Environmental Science and Pollution Research. DOI: [10.1007/s11356-021-16021-8](https://doi.org/10.1007/s11356-021-16021-8). (IF: 4.223)
2. Mandakini Gogoi, Pinaki Bhattacharya, Sudip Kumar Sen, Indranil Mukherjee, Shashi Bhushan, **Shaon Ray Chaudhuri** 2021. Aquaculture effluent treatment with ammonia remover *Bacillus albus* (ASSF01). Journal of Environmental Chemical Engineering, 9(4): 105697. <https://doi.org/10.1016/j.jece.2021.105697> (IF: 5.909)

Provide Images/Flowchart



Ammonia removal with time from actual ammonia rich environmental effluent (AE and non AE) by immobilized biofilm under ambient condition



Aquarium after 1 month of normal operation



Aquarium after 9 months of operation with floating bacterial biofilm and no water change

Potential Users

- Aquaculture Industry
- Aquarium suppliers
- Refinery

Technology Commercialization Contact: Prof Shaon Ray Chaudhuri