

# DEVELOPMENT AND APPLICATION OF CONTINUOUS FLOW GRANULAR BIOREACTOR

## Technology for Licensing

### Keywords:

Continuous flow bioreactor, CFBR, deflector medium, denitrifying granular biomass, biofilm, organic matter removal, nitrogen removal, water treatment, aerobic granulation

### Description:

Nowadays, aerobic granular biofilms and biomass are displayed as an alternative to the use of active sludges in water treatment due to being specially useful in high organic loads elimination, as well as nitrogen and phosphorus elimination.

It is common to find that kind of technology integrated in bioreactors connected in series (BGS), where granular formation is favored by the settling previous to the tank molding. Nevertheless, BGSs configuration plus low flow water treatment, as well as continuous reactors filling and emptying is one of the main disadvantages in that kind of systems.

Continuous flow bioreactors (BRFC) arise as an alternative to BGSs not only for having a higher control and easy handling but also, for being able to perform high water flows purification. However, settling stage removal leads to a biomass loss through effluent outlet, and simultaneously triggers an untoward effect in granules compaction and stability.

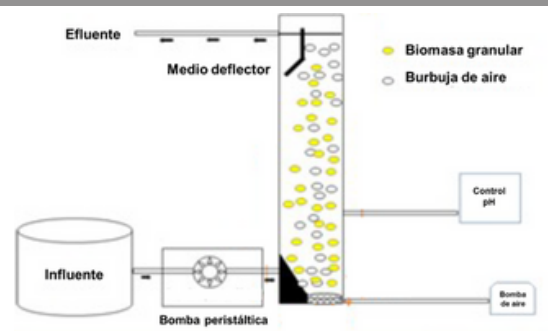
This invention is a new BRFC design for the aerobical and granular biomass that under certain simple operation terms, allow biomass development optimization. The bioreactor has an aerator spot that introduces the oxygen necessary to microorganism growth and makes a convective spot which stimulates the contact between the different substances which are part the fluid, and also a deflector spot connected to the bioreactor exit that is used as a granular trap so they come back inside the bioreactor.

To sum up, this invention is able of combining granular biomass use which can eliminate organic and inorganic material (nitrogen and phosphorus) present in sewage waters in a continuous flow system successfully without biomass loss.

A new bioreactor (BRFC) able to work in continuous flow conditions has been designed. It allows the effective stable, aerobic granular biomass formation using simple operating conditions. This bioreactor is able to eliminate organic and inorganic waste (nitrogen and phosphorus) reducing biomass loss, necessary to perform drinkable and residual water.

## Advantages and Benefits

- » Work on aerobic granular systems under continuous flow conditions
- » Work on high volume inputs
- » Granular biomass formation in continuous systems
- » Reduce biomass loss inside the bioreactor
- » Efficient elimination of organic and inorganic matter
- » Time and resources savings
- » Increased productivity



BRFC

Actuación en el marco del Proyecto OI-Booster: Plan de intensificación de acciones de Transferencia de Conocimiento en Entornos de Innovación Abierta. Objetivo prioritario OP.01 "Refuerzo de la investigación, el desarrollo tecnológico y la innovación".

### Patent status:

Spanish Patent application number: P202230987  
Priority date: 15/11/2022

### Contact:

Oficina de Transferencia de Resultados de Investigación  
(OTRI) - Universidad de Granada