P-024 - AEROBIC GRANULES SYNTHESIZED WITH EPS AND DEGRADING STRAIN RHODOCOCCUS FP1 FOR INDUSTRIAL WASTEWATER TREATMENT

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Background

Aerobic granular sludge-sequencing batch reactors (AGS-SBR) is a promising and innovative wastewater treatment system. AGS is composed of microorganisms embedded in a self-produced extracellular polymeric substances (EPS) matrix, forming spherical sludge aggregates [1,2]. Although AGS tolerance to toxicity, the indigenous microbial communities may not be effective in removing recalcitrant pollutants [3,4]. Bioaugmentation strategies (addition of specific microorganisms to the system) can be a solution to overcome the difficulty to eliminate certain compounds in wastewaters. However, it is still not a well-established strategy.

Method

EPS was extracted from aerobic granules from Nereda® wastewater treatment plants in Utrecht or Garmerwolde, Netherlands. The extraction procedure is as described by Felz et al., 2016 [5]. The synthetic granules were produced using the extrusion technique with CaCl2, by mixing the extracted EPS, a concentrated bacterial suspension of *Rhodococcus* sp FP1 (OD450 of 67.0), and substances 1 or 2. The produced synthetic granules were subjected to a shear stress test, 400 or 800 rpm in a closed vessel for 1 hour, in order to measure their strength.

Results & Conclusions

A specific mixture composed of EPS, bacterial suspension and substance 2 generated strong synthetic granules, similar to Utrecht granules used as a control in the shear stress test. Beads produce only with substance 2 and bacterial suspension showed to be weaker than the granules previously mentioned. Thus, the EPS can be considered a key component to increase the strength of the synthetic granules. However, some inconsistencies were observed for synthetic granules with higher concentration of EPS and substance 2, which could indicate that the composition and crosslinking potential of the EPS could be the limiting factor for the granules strength and not only the EPS concentration.

In summary, EPS composition and concentration can be important factors to be considered when synthesizing strong granules able to endure this shear stress test. In the future, the EPS biocompatibility and 2-fluorophenol biodegradation with these synthetic granules will be tested.

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