

Anaerobic Membrane Bio-Reactors; A viable future wastewater treatment technology or another flash in the pan?

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Based on the literature survey presented in this paper, the fourth generation anaerobic bio-reactor - the AnMBR – appears to address issues around the application of anaerobic systems to wastewaters not conducive to anaerobic biofilm or granule formation like the Short Chain Fatty Acid (SCFA) rich streams viz. (i) AnMBR performance is not dependant on biomass immobilization or granulation, (ii) membranes give a 100% solids-liquid separation resulting in superior effluent quality and (iii) high MLSS can be maintained leading to high Organic Loading Rates (OLRs) and compact reactor design.

Membranes provide a positive solid-liquid separation barrier, retaining biomass in the reactor while effluent can pass through. Currently, ultra-filtration membranes are the most popular membrane pore size in wastewater treatment since it operates under economic Trans Membrane Pressures (TMPs), and retains bacteria and viruses while allowing soluble constituents to pass through. AnMBR research is currently dominated by two reactor configurations; the first is the cross-flow system, in which an external membrane module is mounted on a completely mixed anaerobic reactor. In the second configuration, the membranes are submerged in the mixed liquor and uses recycled biogas for membrane scour. The submerged configuration has gained significant popularity in research in the past few 3 years. The AnMBR technology is still in its infancy, however a 10 fold increase in research outputs has occurred in the past 3 years in this field, proving that major wastewater research groups around the world are considering the AnMBR as a viable treatment method for applying at full scale, despite currently high (but decreasing) membrane costs and the more complicated reactor designs and control schemes required to operate these systems.