

## Session: Biofilm application

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### **Biofilm Morphology Engineering and Development of the Nereda Technology for Wastewater Treatment**

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Biofilms can vary in morphology from a compact smooth structure to a very filamentous and porous biofilm. The main factor governing the morphology is the steepness of the concentration gradient for the growth limiting substrate at the biofilm surface, combined with the shear rate in the reactor. This substrate gradient is influenced by the substrate concentration in solution and the conversion rate in the biofilm. By selecting for a microbial population with a relative low maximal growth rate it is possible to engineer the biofilm morphology is a smooth and compact structure, which can also be grown as granular sludge. This principle is used in the Nereda wastewater technology. Cyclically feeding substrate under anaerobic conditions followed by an aerated period for conversion, selects for slow growing aerobic heterotrophic bacteria that can sequester the substrate under the anaerobic conditions. The very good settling capacity of granular sludge particles makes it possible to integrate the settler into the treatment reactor, resulting in strong process intensification of the wastewater treatment process.

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