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Towards a specific controlling strategy to prevent filamentous bulking and foaming considered as the last major unsolved problem in operation of activated sludge systems

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The successful operation of activated sludge (AS) processes is ultimately depending on a sufficient separation of activated sludge from treated water in secondary clarifiers to guarantee a high effluent quality. However, most AS plants suffer from disturbances in the sludge settling process mainly referred to filamentous bulking and foaming which are described as the last major unsolved problem in the operation of AS systems. Poor settling biomass may lead to low effluent quality, increased economic costs and potential environmental impacts. Up to now, no reliable specific controlling method to prevent filamentous bulking and foaming exists. Our recent research is focused on the development of a specific controlling strategy to avoid filamentous overgrowth. Alongside Fluorescence *In Situ* Hybridization and next generation sequencing were used for the identification of dominant filamentous bulking and foaming bacteria (BFB) in AS systems showing increased abundances of *M. parvicella, Gordonia* and *Chryseobacterium* known to cause filamentous foaming. The combination of real-time polymerase chain reaction for the quantification of these BFB and multidimensional Gas Chromatography for the analysis of waste water composition revealed a highly significant linear relationship between long chain fatty acid (LCFA) loadings and the growth of dominant BFB. Based on these findings a specific controlling strategy was developed with regard to the removal of LCFAs from waste water influents to inhibit the overgrowth of BFB. This controlling strategy was successfully validated in a pilot-scale trial in an industrial WWTP (Germany).

Biography

Thiemo Dunkel has studied Chemical Engineering (Bachelor & Master of Engineering) at the Niederrhein University of Applied Sciences from 2006 to 2012. In 2010 he has started working as a Project Engineer in the petrochemical company INEOS in Cologne managing projects in the WWTP on site. He has started his PhD in 2012 in parallel with the University of Duibsurg-Essen, Germany. He has published 2 papers in reputed journals in 2015.

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