Investigating biofilm structure developing on carriers from lab-scale moving bed biofilm reactors based on light microscopy and optical coherence tomography

Chunyan Li, Simon Felz, Michael Wagner, Susanne Lackner, Harald Horn

PII: S0960-8524(15)01408-X
DOI: http://dx.doi.org/10.1016/j.biortech.2015.10.013
Reference: BITE 15638

To appear in: *Bioresource Technology*

Received Date: 13 August 2015
Revised Date: 28 September 2015
Accepted Date: 1 October 2015

Please cite this article as: Li, C., Felz, S., Wagner, M., Lackner, S., Horn, H., Investigating biofilm structure developing on carriers from lab-scale moving bed biofilm reactors based on light microscopy and optical coherence tomography, *Bioresource Technology* (2015), doi: http://dx.doi.org/10.1016/j.biortech.2015.10.013

Investigating biofilm structure developing on carriers from lab-scale moving bed biofilm reactors based on light microscopy and optical coherence tomography

Chunyan Li[a], Simon Felz[a,b], Michael Wagner[c], Susanne Lackner[d], Harald Horn[a,e*]

[a]Chair of Water Chemistry and Water Technology, Karlsruhe Institute of Technology, Engler-Bunte-Ring 9, 76131, Karlsruhe, Germany

[b]Department of Biotechnology, Faculty of Applied Sciences, Delft University of Technology, Julianalaan 67, 2628 BC Delft, The Netherlands

[c]Institute of Functional Interfaces, Karlsruhe Institute of Technology, Hermann-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen, Germany

[d]Urban Material Flow Management Technologies, Bauhaus-Institute for Infrastructure Solutions, Bauhaus University Weimar, Coudraystraße 7, 99421 Weimar

[e]DVGW Research Laboratories Water Chemistry and Water Technology, Engler-Bunte-Ring 9, 76131, Karlsruhe, Germany

Corresponding author: * Tel: +49 72160842580 Fax: +49 72160846497

Email: harald.horn@kit.edu

Abstract

This study focused on characterizing the structure of biofilms developed on carriers used in lab-scale moving bed biofilm reactors. Both light microscopy (2D) and optical coherence tomography (OCT) were employed to track the biofilm development on carriers of different geometry and under different aeration rates. Biofilm structure was further characterized with respect to average biofilm thickness, biofilm growth velocity, biomass volume, compartment filling degree, surface area, etc. The results showed that carriers with a smaller compartment size stimulated a quick establishment of biofilms. Low aeration rates