



## A proper size measure for quorum sensing ignition

Sams, Thomas; Ferkinghoff-Borg, Jesper

*Publication date:*  
2018

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Sams, T., & Ferkinghoff-Borg, J. (2018). *A proper size measure for quorum sensing ignition*. Poster session presented at 8th ASM Conference on Biofilms, Washington DC, District of Columbia, United States.

---

### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

# 8th ASM Conference on Biofilms

October 7 – 11, 2018

Washington, DC



[Print this Page for Your Records](#)

[Close Window](#)

**Control/Tracking Number:** 2018-A-278-ASM

**Activity:** Abstract

**Current Date/Time:** 8/24/2018 4:03:08 AM

**A Proper Size Measure for Quorum Sensing Ignition**

**Author Block:** T. Sams, J. Ferkinghoff-Borg;  
Biomedical Engineering, Technical University of Denmark, Lyngby, DENMARK.

**Abstract:**

Biofilm aggregates of bacteria are thought to be able to align their phenotypic behavior with size, density, and growth state of the ensemble. This is achieved by a cell-cell regulatory system termed quorum sensing. In the generic quorum sensor a positive feedback in the production of signal molecules defines the conditions at which the collective behavior switches on. In spite of its conceptual simplicity, a proper measure of biofilm colony "size" has been lacking. We establish that the cell density multiplied by a geometric factor constitutes an appropriate size measure. The geometric factor is the square of the radius for a spherical colony. For a disk-shaped biofilm the geometric factor is the horizontal dimension multiplied by the height, and the square of the height of the biofilm if there is significant flow above the biofilm. Remarkably simple factorized expressions for the size are presented. *Mol. BioSyst.*, 2014, 10, 103-9

**Topic (Complete):** Biofilm: From Nature to Models  
**Presentation Preference (Complete):** Poster or Oral presentation  
**Additional Info (Complete):**  
**Level of education?:** Ph.D.  
**Travel Grants:** No  
**Gender:** Male  
**Minority:** No

**Status:** Complete

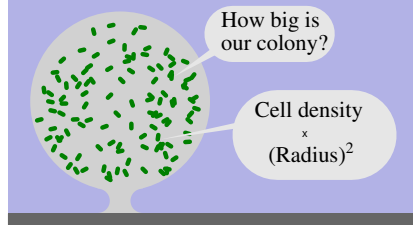
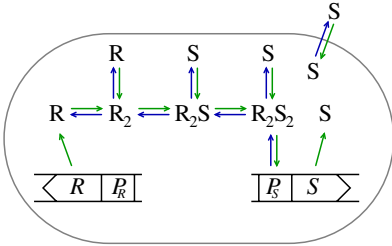
[American Society for Microbiology](#)  
1752 N Street N.W.  
Washington, D.C. 20036  
Phone: (202) 737-3600

[Leave cOASIS Feedback](#)

# A proper size measure for Quorum Sensing Ignition

Thomas Sams and Jesper Ferkinghoff-Borg  
 Technical University of Denmark

Poster #049  
 ASM Conference on Biofilms  
 Washington DC, USA, October 6-11, 2018



Ferkinghoff-Borg & Sams  
 Mol. BioSyst 10, 103 (2014)  
 doi: 10.1021/bi400315s

## QS reaction-diffusion model

1. Cells produce signal molecules, S, at rate  $[b_s; k_s]$ .
2. Signal molecules diffuse between cells.
3. Cells produce regulator protein, R.
4. Regulators bind signal molecules ( $K$ ).
5. SR complex promotes S production ( $K_s$ ).
6. Signal-Regulator complex induces attack.

**Take home**

Size Measure:

$$\Sigma = \rho_v \mathcal{R}^2$$

Ignition point:

$$r_a = [R_2S_2] \sim \frac{b_s}{k_s} K_s$$

