

Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Scale reduction impact on bacterial growth DAVID LALANNE-AULET, PIERRE GUILLOT, Rhodia/Solvay-Laboratory of the Future, ANNIE COLIN, University of Bordeaux I, PHILIPPE MARCHAL, Solvay - RICL — Miniaturized tools for microbiological tests intensification have proven their impressive potential among the past decade and keep focusing a lot of researches. However, systematic comparison with usual tests is still lacking and prevents thus the implementation of these new methods. In this work, we study the scale effects on the growth of a bacterial population in order to identify growth-limiting parameters and determine ranges in which miniaturized tools really mimic usual tests. Incubations are performed in miniaturized droplets engineered in microfluidic devices with biocompatible fluorinated oil. This oil phase replaces the usual atmosphere as gas reservoir. The impact of size and environment modifications on microbial growth has to be evaluated. At first sight, system's size reduction is favorable because it minimizes nutrients diffusion times. However, the amount of needed gas available (O₂) and the ability of storing undesirable gas (CO₂) become limited. We show that oxygen does not limit the growth, whereas carbon dioxide accumulation can decrease growth yields by various mechanisms that will be discussed. Through this study we optimize growth conditions in miniaturized tools for long-term cultures.

David Lalanne-Aulet
Rhodia/Solvay-Laboratory of the Future

Date submitted: 29 Jul 2013

Electronic form version 1.4