Comments

Comment on Evaporation-Induced Patterns from Droplets Containing Motile and Nonmotile Bacteria

We were surprised to read in a recent letter[1] by Nellimoottil et al. the statement "The present observations indicate that during the evaporation of the droplet bacterial motion toward the center of the droplet is significant, in addition to the usual advective fluid flow toward the edge." Upon the basis of a series of elegant approaches, the authors deduce from a comparison of deposition patterns from evaporating drops of water containing motile and nonmotile bacteria that the motile species migrate against the radial convection, which is known to produce ring patterns in evaporating sessile drops.[2] In doing so, the authors ignore both standard knowledge in microbiology and relevant material already published on the subject.[3] Why should bacteria chemotax toward the center of an evaporating water drop, against the convective flow, in which nutrients, if present, would be carried by the convection to the edge of the drop? Unfortunately, the authors paid no attention to the experimental and modeling work published on strategies designed to identify microorganisms in evaporating water drops. Specifically, we demonstrated in a model[3] (see also Figure 1) that the discrimination of microorganisms, even in a sea of equally sized artificial objects, is possible and would principally exploit bioadhesivity, which might be based on a slime and/or fimbriae functioning as anchors. In other words, the bacteria assumed by the authors to migrate against the convective flow were most likely simply more sticky than the nonmotile ones, which formed a distinct ring.[1] Regrettably,

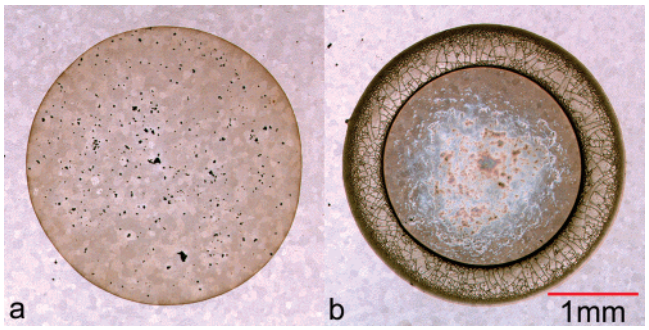

Figure 1. In evaporating water drops, hydroxyapatite microparticles tend to stick to substrates upon contact (a). Under the same conditions, polystyrene nanospheres tend to form perfect rings (b).

the authors misinterpreted patterns formed by evaporating water drops containing hydroxyapatite nanoparticles, which we presented in the paper cited by them to exemplify pronouncedly adhesive systems in which the radial convection becomes ineffective. To analyze and prove the presumed bacterial migration, the authors may immobilize a suitably encapsulated chemoattractant at the center of a slowly evaporating drop and record the process by video microscopy.

Andrei P. Sommer* and Dan Zhu

Institute of Micro and Nanomaterials, University of Ulm, Albert-Einstein-Allee 47, 89081 Ulm, Germany

Received July 15, 2007
In Final Form: August 12, 2007

LA7021159

(1) Nellimoottil, T. T.; Rao, P. N.; Ghosh, S. S.; Chattopadhyay, A. *Langmuir* **2007**, *23*, 8655−8658.
(2) Sommer, A. P.; Rozlosnik, N. *Cryst. Growth Des*. **2005**, *5*, 551−557.
(3) Sommer, A. P.; Gheorghiu, E.; Cehreli, M.; Mester, A. R.; Whelan, H. T. *Cryst. Growth Des*. **2006**, *6*, 492−497.

10.1021/la7021159 CCC: $37.00
Published on Web 10/13/2007