

Abstract Submitted  
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**The “Swiss cheese” instability of bacterial biofilms** HONGCHUL JANG, ROBERTO RUSCONI, ROMAN STOCKER, MIT — Bacteria often adhere to surfaces, where they develop polymer-encased communities (biofilms) that display dramatic resistance to antibiotic treatment. A better understanding of cell detachment from biofilms may lead to novel strategies for biofilm disruption. Here we describe a new detachment mode, whereby a biofilm develops a nearly regular array of  $\sim 50\text{-}100\ \mu\text{m}$  holes. Using surface-treated microfluidic devices, we create biofilms of controlled shape and size. After the passage of an air plug, the break-up of the residual thin liquid film scrapes and rearranges bacteria on the surface, such that a “Swiss cheese” pattern is left in the residual biofilm. Fluorescent staining of the polymeric matrix (EPS) reveals that resistance to cell dislodgement correlates with local biofilm age, early settlers having had more time to hunker down. Because few survivors suffice to regrow a biofilm, these results point at the importance of considering microscale heterogeneity in assessing the effectiveness of biofilm removal strategies.

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