geothermalis were analyzed by using 6-well polystyrene plates. The photocatalytic surfaces were put in the wells, the wells filled with test medium and inoculated to 4% (vol/vol). The plates were incubated at 45°C for 1 d under high flow and continuous illumination with 360 nm light. On the least adhering TiO_2 film (K 1741, prepared by ALD) the number of attached *D. geothermalis* cells was 3 orders of magnitude less than compared to the same surface, which was not illuminated. We also studied function of photocatalytic surfaces against pre-grown biofilms. After 1-2 d incubation in the dark, pre-grown biofilms were exposed to 360 nm light for 1 d. In the case of the least adhering TiO_2 film, irradiation with 360 nm light for 1 d removed (> 99 %) pre-grown biofilm with $> 5 \times 10^6$ cells/cm^2. Adhesion of *D. geothermalis* to sterilized molecular-coated surfaces was studied at 45°C for 4 h under high-speed rotation. *D. geothermalis* cells grown in R2-broth were washed by centrifugation and re-suspended to double volume of sterilized tap water. Bacteria attached to TiO_2 coated macroporous surfaces regardless of the pore size to high density (10^6–10^7 cells/cm^2). Attachment to microporous SiO_2 coated surface was 20-30 % of that to TiO_2/SiO_2 or TiO_2 coated surfaces, indicating that SiO_2 attracted less *D. geothermalis* than TiO_2. The results encourage to further investigate photocatalytic surfaces. However surfaces responsive to visible light are needed for reasons of occupational health. For processes where submerged illumination is not applicable further research is needed on surfaces repelling biofilm by light independent mechanism.
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165(C)

GLUTARALDEHYDE EXPOSED *PSEUDOMONAS FLUORESCENS* – A CASE OF BIOFILM PERSISTENCE?

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From the assessment of the recovery capability of *pseudomonas fluorescens* atcc 13525[t] after exposure to several glutaraldehyde (gta) concentrations (100, 200 and 400 mg/l) and exposure times (1 and 2 hours), it was found that, for gta concentrations above 100 mg/l, whatever the exposure time, bacterial cells presented different growth patterns in solid media. after this statement, the recovered cells were initially characterized using api ne20 strips and species identification was obtained using the api database. the type culture and the cells obtained after treatment with concentrations below 200 mg/l were identified as *p. fluorescens*. conversely, the identification of cells exposed to higher concentrations of gta failed. the electrophoretic profiles of both the type culture and the cells exposed to gta were obtained by pcr, using the primer t3b. the results showed identical profiles for the type culture and the cells exposed to low gta concentrations, and a totally different pattern for cells exposed to gta concentrations above 200 mg/l. sequencing of the 16s rdna gene is under way in order to further clarify the differences observed. the *p. fluorescens* atcc 13525 (used as control) and the cells treated with 200 mg/l of gta during 2 hours were selected for further studies. a comparative study was carried out between the above referred cells in terms of morphological structure, surface properties, respiratory activity, biofilm formation ability and susceptibility to gta. the results showed that the cells treated with 200 mg/l of gta presented an elongated structure, were about 30 times less active in terms of respiratory activity and were more hydrophilic. concerning biofilm formation, both tested cells presented biofilm formation ability, but the gta treated cells produced about 2 times more mass of biofilm. however, this biofilm had a specific respiratory activity 3 times less than the one formed by the control culture. the biofilm behaviour immediately after exposure to 200 mg/l of gta during 2 hours, was similar for both situations studied, since a low biofilm removal and inactivation was achieved. however, 7 hours after gta exposure, only 55% of the biofilm formed by the control culture remained attached to the surface, while for the biofilms formed by the treated cells all the deposit remained attached to the surface.
the results obtained in this work indicate that cells submitted to gta treatment may give rise to biofilms harder to remove and consequently more persistent, than non-treated cells. therefore, care must be taken in the selection and application of biocides in industrial biofilms.

166(A)

ANTI-BIOFILM ACTIVITY OF CHLORINE DIOXIDE ON PSEUDOMONAS AEROGINOSA IN BIOFILMS PROPAGATED *IN VITRO* ON FLAT SURFACES AND DENTAL UNIT WATER LINES (DUWL)

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Background: Biofilms are ubiquitous in the environment, and they are the predominant microbial form in nature. They propagate on surfaces such as rocks, bathroom tiles, pipes, and DUWL. They are also of major concern in the medicine, where they propagate on medical equipment and occur in forms in the body, with examples such as cystic fibrosis and conjunctivitis. Clinical microbiologists are already well aware of the much higher antibiotic resistance of biofilm organisms when compared to their planktonic counterparts. While this is believed to be true for biocides as well, with emerging data to support this hypothesis, standardized methods to grow biofilms and test them for biocide resistance are only now becoming available.
Objectives: This study was designed to use a bioreactor for propagation on various surface types and evaluation of the anti-biofilm activity of biocides in a Good Laboratory Practice (GLP) laboratory setting. The test is designed to simulate consumer use and conforms to American Society for Testing and Materials (ASTM) test method designated E 1427-00 with some modifications.
Materials and Methods: Bioreactors developed at the Center for Biofilm Engineering, Montana State University and marketed by BioSurface Technologies Corp. (Bozeman, MN), modified by MICROBIOTEST, INC. (Sterling, VA), and a lumina flow system simulating DUWL, developed by MICROBIOTEST, INC., were used to propagate *Pseudomonas aeruginosa* biofilms *in vitro*. Anti-biofilm activity of various concentrations of chlorine dioxide (ClO_2) was evaluated.
Results: Anti-biofilm activity showed that biofilms required