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Fabrication of a Continuous Flow System for Biofilm Studies

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Abstract : Modern and current models such as flow cell technology which enhances a non-destructive growth and inspection of the sessile microbial communities revealed a great understanding of biofilms. A continuous flow system was designed to evaluate possibility of biofilm formation by Escherichia coli DH5α on the stainless steel (type 304) under continuous nutrient supply. The result of the colony forming unit (CFU) count shows that bacterial attachment and subsequent biofilm formation on stainless steel coupons with average surface roughness of 1.5 ± 1.8 µm and 2.0 ± 0.09 µm were both significantly higher ($p \leq 0.05$) than those of the stainless steel coupon with lower surface roughness of 0.38 ± 1.5 µm. These observations support the hypothesis that surface profile is one of the factors that influence biofilm formation on stainless steel surfaces. The SEM and FESEM micrographs of the stainless steel coupons also revealed the attached Escherichia coli DH5α biofilm and dehydrated extracellular polymeric substance on the stainless steel surfaces. Thus, the fabricated flow system represented a very useful tool to study biofilm formation under continuous nutrient supply.

Keywords : biofilm, flowcell, stainless steel, coupon
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