

Background and Significance

- *Bacillus thuringiensis* (Bt), a gram positive, biofilm-forming bacteria, was used to grow biofilms in chlorine treated wastewater from San Augustine WWTP, Nacogdoches WWTP, sterilized water, and tap water.
- Biofilm – a community of microbial cells that form chains and attach to surfaces by secreting extracellular polymeric substances (EPS) like DNA, proteins, and polysaccharides
- Scanning electron microscopy (SEM) was used to study the extent of biofilm growth as well as its structure.
- Novogene: a global biotechnology company specializing in next-generation sequencing (NGS), transcriptomics, RNA-sequencing, and other bioinformatic services.
- RNA-Sequencing (RNA-seq): A technique used to measure gene expression by identifying and quantifying RNA transcripts, showing which genes are active and how their activity varies under different conditions.

Objectives

- Determine RNA expression profiles of the biofilm produced by *Bacillus thuringiensis* in the different treated wastewater samples.
- Assess the correlation between transcriptomic variations and the quantity of biofilm produced by the different samples.

Future Studies

- Analyze KEGG Enrichment Analysis from Novogene report.
- Isolation and characterization of genomic DNA and biofilm specific protein
- Analyze Circos Plots from Novogene report.

Gene Ontology Enrichment Analysis and Imaging Studies

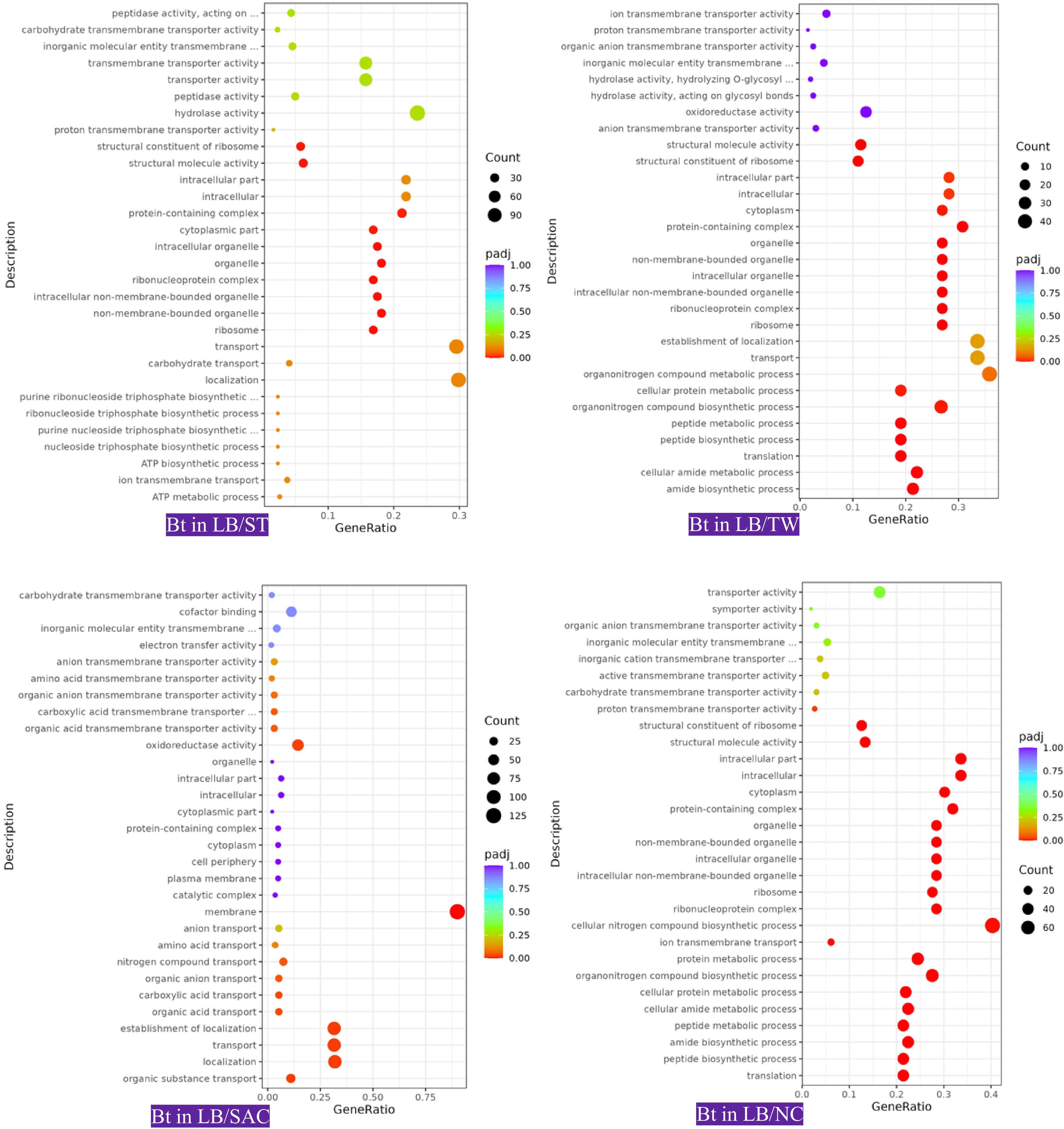


Figure 1: Gene Ontology Enrichment Analysis of Biofilms

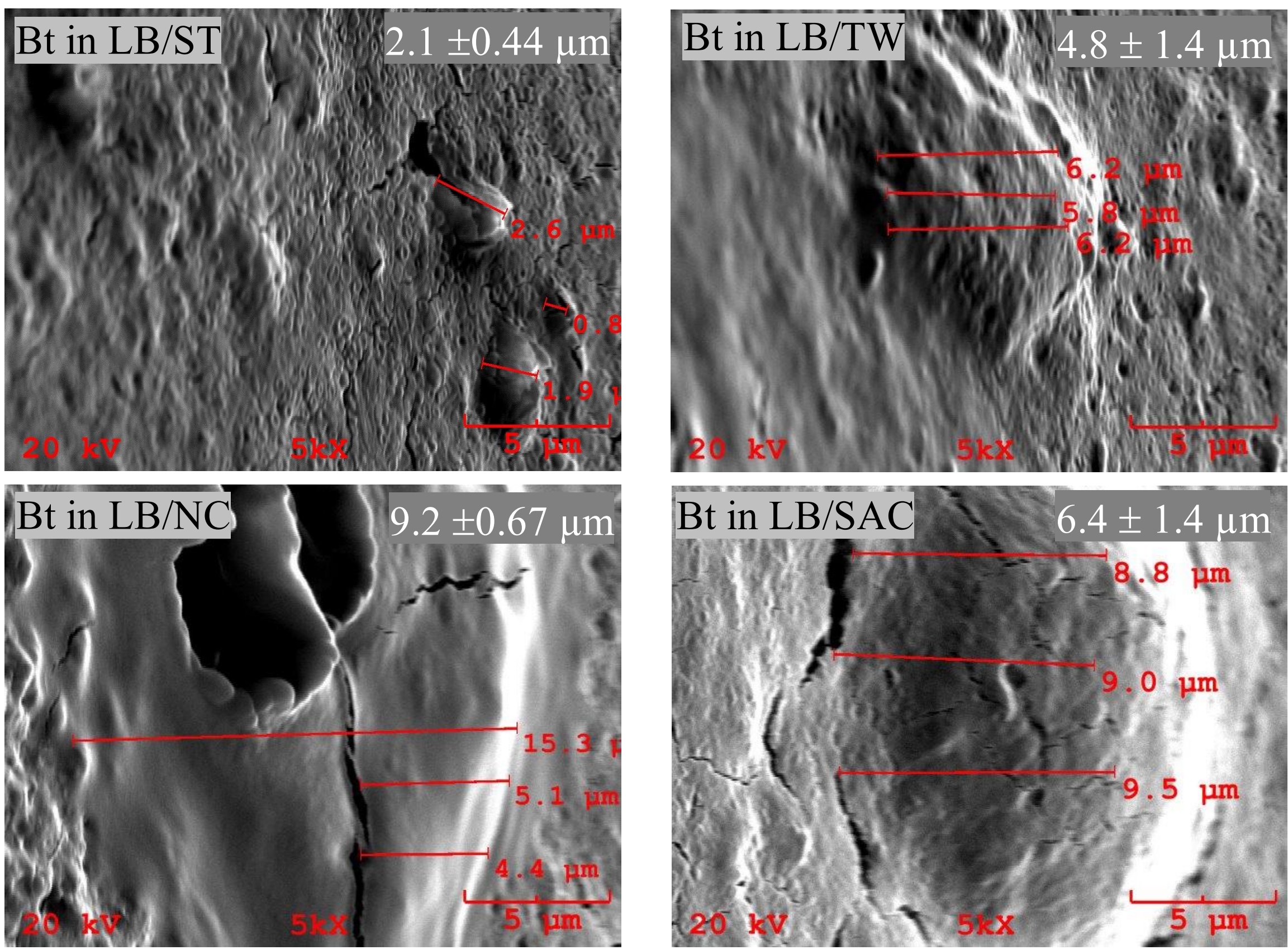


Figure 2: Height of the Biofilm hills measured at 5000x magnification tilted at 65° angle

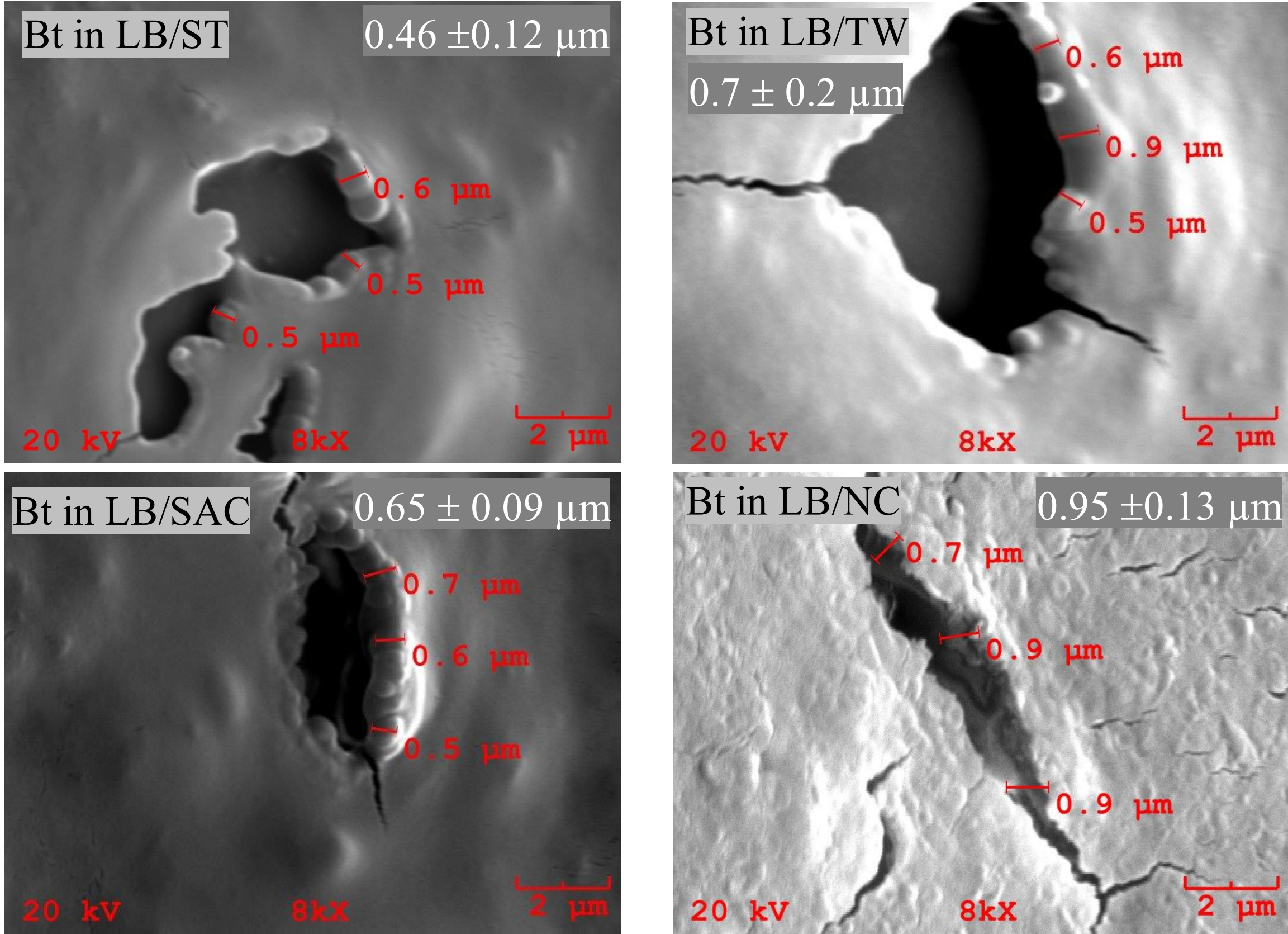


Figure 3: Thickness of Biofilms measured at 8000x magnification tilted at 45° angle

Observations and Conclusions

- The composition of chlorine treated wastewater does induce genomic alterations in bacteria.
- SEM images show the height and surface structure of the biofilm.
- There is significant enrichment in genes related to the formation of biofilm in all samples.
 - LB/TW, LB/NC, and LB/ST all have significant enrichment in genes related to the synthesis of ribosomes and proteins.
 - LB/SAC has significant enrichment in genes related to nutrient distribution and uptake.

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References

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