

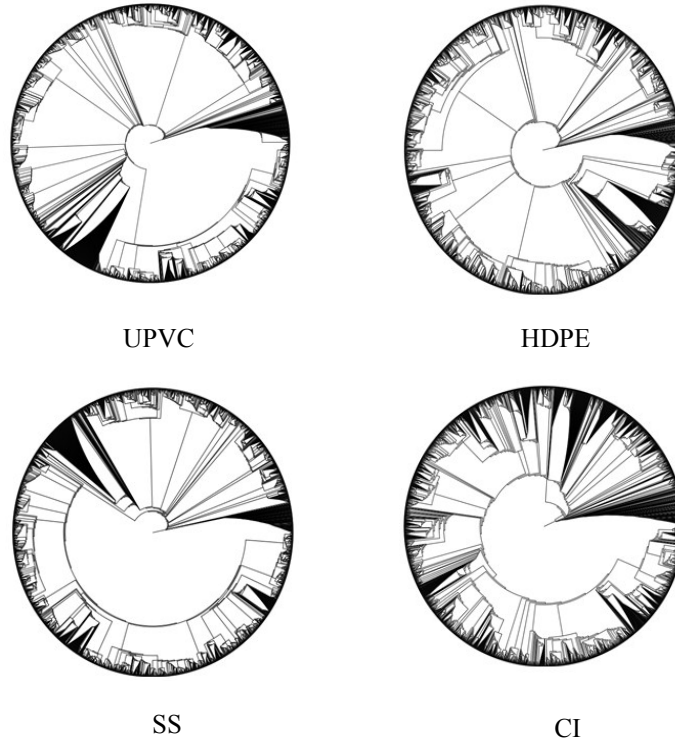
### Supplementary file

**Fig. S1** The evolutionary topological tree of the OTU system with four types of tube film (abundance values greater than 10)

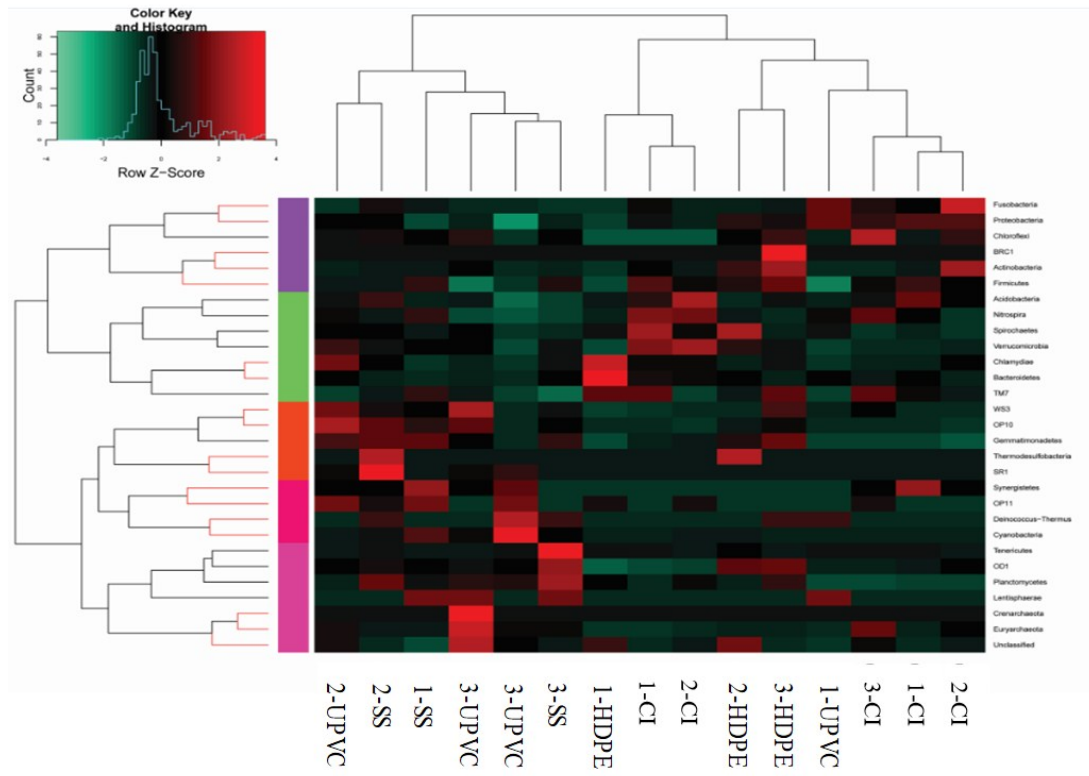
**Fig. S2** The heat-map diagram of different tubing biofilm samples and double hierarchical clustering of bacterial communities

**Fig. S3** Top-100 features OTU in different samples of abundance heat-map

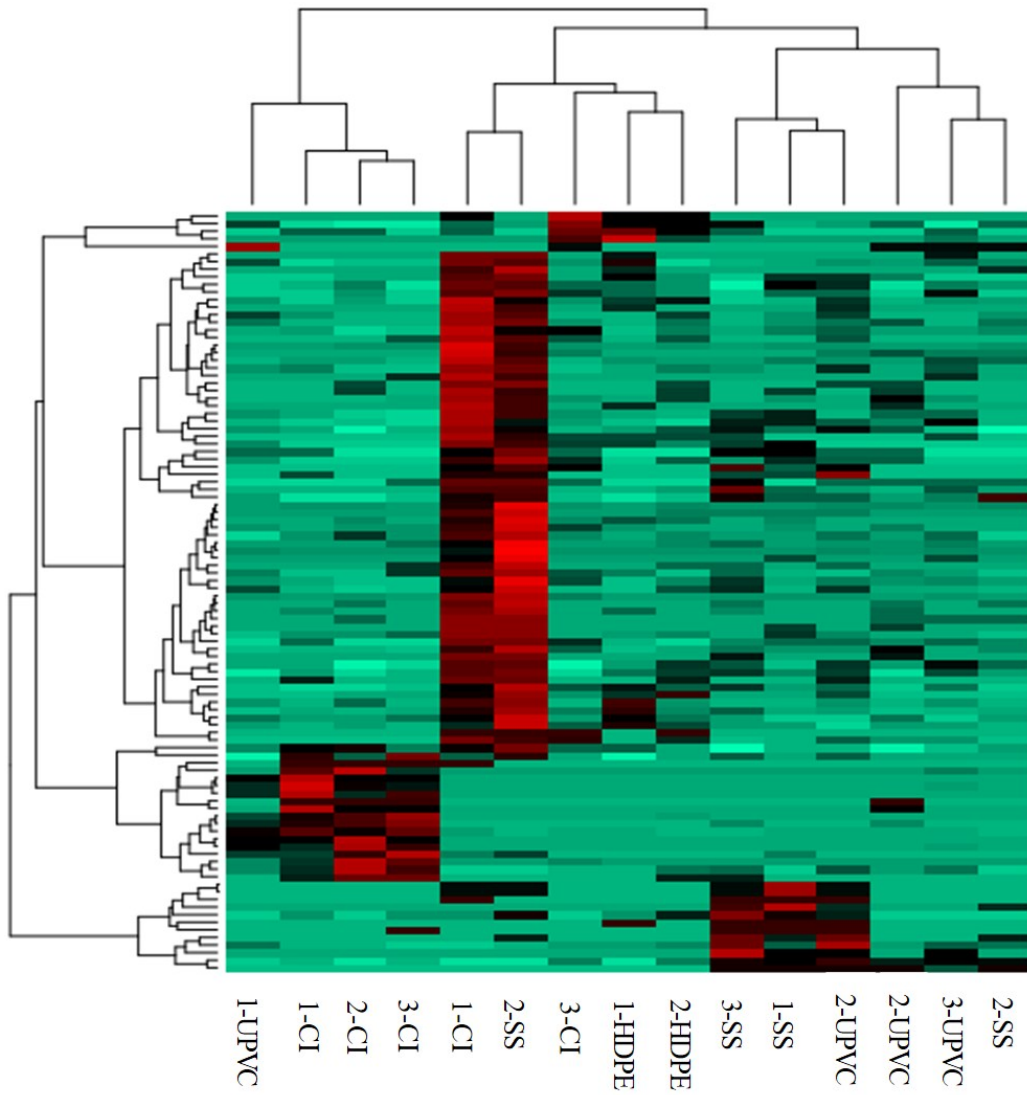
**Fig. S4** Clusters of orthologous groups (COG) of proteins comment result chart of dominant species homologous genome



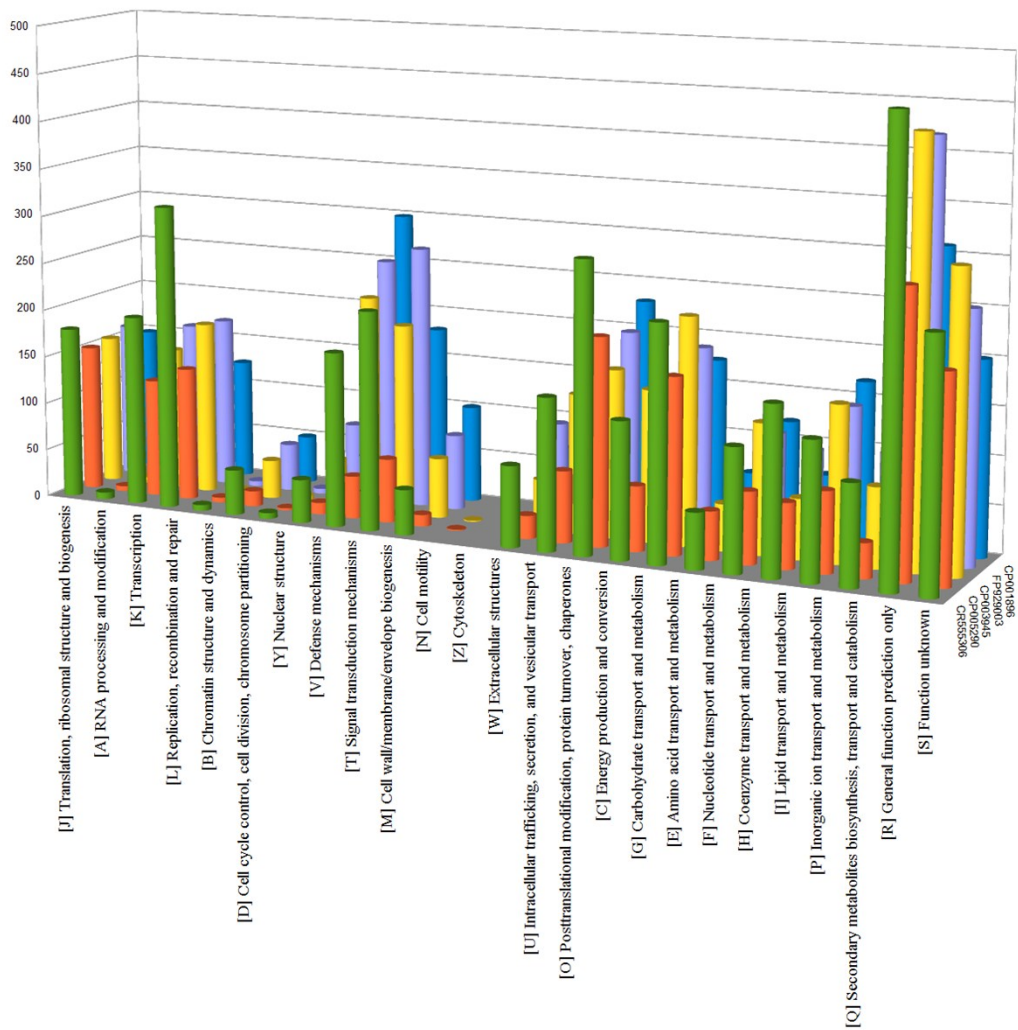
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