



**Università degli Studi di Napoli Federico II**

**PhD in Biotechnology - 37<sup>th</sup> cycle**

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## **Role of environmental conditions on bacteria motility and biofilm formation**

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Biofilm formation is a complex and resilient structure, leading to contamination in different fields. This process is strongly affected by environmental conditions, such as chemical and physical factors [1]. The objective of this study is to examine how both gravitational and flow-induced stresses impact on biofilm formation and cell motility. *Pseudomonas fluorescens* will be used as a model organism to evaluate motility during biofilm formation, furthermore CRISPR interference will be used to investigate the role of specific genes that control motility. A primary investigation will be conducted using commercial microfluidic flow channels, but a custom-made setup will be designed to investigate biofilm formation on a larger scale, in order to investigate conditions of interest for industrial application in aerospace. A protocol for solid surfaces functionalization will be developed using innovative coating techniques like Oxygen Plasma. Mathematical models like Persistent Random Walk [2] will be taken into account to quantify and describe bacterial motility. The methodology developed will be applied to samples and conditions of interest for industrial applications. Specific attention will be placed to control biocontamination in closed environments, such as aircraft cabins and space capsules.

### **References**

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2. Dickinson, R.B.; Tranquillo, R.T. Optimal estimation of cell movement indices from the statistical analysis of cell tracking data. *AIChE Journal* 1993, 39, 1995-2010, doi:10.1002/aic.690391210.