

# EPS SYNTHESIZED BY ANTARCTIC PLANT-ASSOCIATED BACTERIA AS A SOURCE OF FUNCTIONAL BIOPOLYMERS FOR CHEMICAL TECHNOLOGY

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Exopolysaccharides (EPS) produced by various microbial species represent a diverse and high-value class of biopolymers with significant potential for industrial and chemical applications. These biopolymers, which are secreted extracellularly, typically form a protective layer around the cell and are primarily composed of monosaccharides, often with non-carbohydrate substituents. The structural variability of EPS – including differences in molecular weight, monomer composition, and branching architecture – imparts a wide range of unique physicochemical properties, such as high viscosity, excellent gelling capacity, and emulsion stabilization. Consequently, bacterial EPS have emerged as promising, sustainable alternatives to conventional petroleum-based or plant-derived polymers, offering superior biocompatibility and biodegradability. This work focuses on evaluating physical and chemical parameters of EPS synthesized by two bacterial strains associated with Antarctic plants – *Hafnia psychrotolerans* 25.2 and *Pseudomonas sp.* 39.4 – extracted by different methods to unlock its specific functional utility in chemical technology.

**Materials and methods.** The bacteria were cultivated under stationary conditions in Nutrient Broth (HiMedia Ltd.) and Minimal Salt Media (MSM) at temperatures of 25°C and 37°C for a period of six days. Biofilm fractions were collected using pipette tips (1000 µl), while the planktonic cell fractions were collected by centrifugation (4000 rpm, 10 min). Three extraction protocols were applied to the studied samples: acidic extraction, formamide extraction, and EDTA extraction. The determination of parameters such as pH, density, relative viscosity, and surface tension was carried out using standardized laboratory protocols.

**Results.** The biofilm fraction from both strains, cultivated in NB medium at 25°C without prior acidic hydrolysis, demonstrated the most promising indices for both viscosity and density parameters. Regarding surface tension, the highest value was recorded for EPS extracted with formamide from the planktonic fraction of the *Hafnia psychrotolerans* 25.2 strain in the minimal salt medium (MSM).

**Conclusions.** Endophytic bacteria isolated from harsh harsh environments possess high potential for EPS synthesis with subsequent industrial application.