Biograpе: Bacterial Cellulose Biosynthesis Using Grape Byproduct, Phase II

Machado , Amanda (School: Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Sul (IFRS) - Campus Osório)

The state of Rio Grande do Sul is responsible for 90% of juices and wine production in Brazil and its processing generates up to 30% of waste. Therefore, the goal of this research was to optimize the production of bacterial cellulose membranes using grapes' byproducts. Biosynthesis was performed in a static culture medium using as inoculum a symbiotic culture of bacteria and yeast for 14 days. A factorial design 2^3 with surface response methodology was performed to evaluate the glucose, sucrose and grape variables byproduct in biomembrane (BM) optimization. They were dried at 35ºC and characterized with mechanical properties, moisture, solubility, thickness and biodegradability. The Variance Analysis was used to analyze the significance at 95% reliability. Wine byproducts showed higher yields of BM compared to those produced with juice byproducts. The BM related to the central points showed higher flexibility, resistance and thickness. All BM presented a thickness of less than 1 mm and great mechanical properties, with tensile strength up to 15,58MPa and elongation at break until 29,02%. These results follow the American Society for Testing and Materials norms. Due to bacterial cellulose membrane being a versatile biopolymer, in this project a proton-exchange biomembrane applicability was studied. The ionic conductivity of juice byproduct BM developed was higher than the literature. This project has successfully achieved its aim, scientifically proving that it is possible to optimize the production of bacterial cellulose using the grape byproduct as a substrate. Grape byproducts can be used in bioprocesses to boost alternatives to synthetic polymers.

Awards Won: