

## **Moisture-wicking prosthetic liner with antimicrobial properties**

Eleanor Britson 1, Dr. Dr. Jorge Zuniga 1 Coauthor, ebritson@unomaha.edu,

1 - Department of Biomechanics, University of Nebraska Omaha, Omaha, NE;

Excessive sweating and bacterial growth on the residual limb are significant challenges faced by prosthetic users. To address these concerns, we developed a prototype for a prosthetic liner designed to combat both excessive perspiration and bacterial proliferation. The key innovation of this liner is the material used—Styrene-ethylene-butylene-styrene (SEBS), a polymer embedded with a copper-based composite that provides antimicrobial properties. The material not only promotes comfort but also helps to maintain hygiene by reducing bacterial growth.

The prosthetic liner is engineered to handle up to 500 mL of sweat in just 38 minutes, significantly reducing moisture buildup on the residual limb. In addition, SEBS demonstrates a remarkable ability to reduce bacterial concentration by more than 99.99%, with no viable bacteria detected after 24 hours. The material achieves a 5-log reduction in bacterial count, further ensuring the prevention of infections commonly associated with prosthetic use.

By combining these advanced features—effective moisture management and superior antimicrobial properties—our prototype aims to improve both the comfort and health of prosthetic users. This innovative approach has the potential to significantly enhance the user experience, making prosthetics more hygienic and comfortable for daily use. The findings from this development could lead to the creation of more efficient and health-conscious prosthetic solutions.