A STRETCHABLE ENCAPSULATION MATERIAL WITH HIGH DYNAMIC WATER RESISTIVITY AND TISSUE-MATCHING ELASTICITY

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Inventors: Xudong Wang, Yan Shao

The Invention

UW-Madison researchers have discovered a new polymer blend based on polyisobutylene (PIB) that can simultaneously achieve a very low water permittivity under dynamic straining conditions, while also retaining tissue-like elasticity. PIB can be formed in different molecular weights spanning from liquid to solid with a wide range of mechanical modulus. In this work, a binary PIB blend-based package material was developed, where a high molecular weight PIB (H-PIB) was chosen as the matrix to form an entangled network to endow desired stretchable and elastic properties, and low molecular weight PIB (L-PIB) acted as a plasticizer to enhance the movement of molecule chains to decrease the elastic modulus. The modulus of the PIB blend film at a L-PIB to H-PIB weight ratio of 6:4 demonstrated an elastic modulus of 62 KPa, matching those of most body tissues. This PIB blend film demonstrated excellent encapsulation performance in an aqueous environment under dynamic mechanical strains, allowing a packaged triboelectric nanogenerator to operate continuously for 2 weeks in a water environment. This work provides the first materials solution for packaging flexible implantable medical devices to achieve long-term in vivo operations in a fluidic physiological environment.

Additional Information

For More Information About the Inventors

- Xudong Wang

Tech Fields

- Medical Devices : Device coatings

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867