

## Development of an Auxetic Tissue Implant

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**Abstract :** The developments in biomedical industry have demanded the development of biocompatible, high performance materials to meet higher engineering specifications. The general requirements of such materials are to provide a combination of high stiffness and strength with significant weight savings, resistance to corrosion, chemical resistance, low maintenance, and reduced costs. Auxetic materials which come under the category of smart materials offer huge potential through measured enhancements in mechanical properties. Unique deformation mechanism, providing cushioning on indentation, automatically adjustable with its strength and thickness in response to forces and having memory returns to its neutral state on dissipation of stresses make them good candidate in biomedical industry. As simple extension and compression of tissues is of fundamental importance in biomechanics, therefore, to study the elastic behaviour of auxetic soft tissues implant is targeted in this paper. Therefore development and characterization of auxetic soft tissue implant is studied in this paper. This represents a real life configuration where soft tissue such as meniscus in knee replacement, ligaments and tendons often are taken as transversely isotropic. Further, as composition of alternating polydisperse blocks of soft and stiff segments combined with excellent biocompatibility make polyurethanes one of the most promising synthetic biomaterials. Hence selecting auxetic polyurathylene foam functional characterization is performed and compared with conventional polyurathylene foam.

**Keywords :** auxetic materials, deformation mechanism, enhanced mechanical properties, soft tissues

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