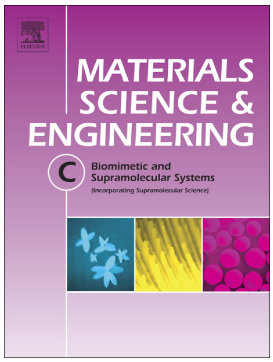

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Designing of Advanced Smart Medical Stocking using Stress-memory Polymeric Filaments for Pressure Control and Massaging

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Abstract

Compression treatment for the patients with chronic disorders such as venous ulcers and varicose veins needs the proper and adequate level of pressure sustainability. This has been a great challenge for health practitioners and stocking manufacturers even till today. There is an imperious need of any research, where internal compression pressure can be controlled or readjusted externally. In line with this, for the first time this study is focused mainly to design and optimize the smart stocking structure by integrating the stress-memory polymeric filament as a main load bearing element. Six different structures were employed to prepare the stocking fabric tubes. All the structures were investigated for pressure analysis and studied the effect of physical parameters such as temperature, strain, and leg radius. It is possible to control the level of massage effect by varying the stocking structures. An empirical relationship is derived, which provides the knowledge for how to control the stocking pressure with structural modifications like never done before. The effect of massage function on blood flow velocity in the popliteal vein on lower limb was objectively measured by Doppler ultrasound scanning. This study also sheds the insight of stocking structural modification for pressure control and provide the benchmark for achieving the efficient compression. This advanced stress-memory polymeric filaments based multifunctional compression stocking provides static pressure, massage effect, and easy size fitting in a more controlled manner for smart compression therapy.

Keywords

Compression stocking, compression therapy, stress-memory, massage effect, memory filaments.