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### **Neuronal Response to Memory Shape Polymer Aerogel**

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### **ABSTRACT**

Peripheral nerve injuries (PNI) are a frequent health problem with high social, medical, and economic consequences [1]. Despite the recent efforts to improve nerve regeneration, current techniques and materials used to accelerate nerve repair are passive and do not show the desired results [2]. Therefore, there is a pressing need to keep researching novel techniques and materials for accelerated nerve repair. More specifically, it is essential to continue to understand the nerve behavior due to its surroundings to provide the best fit in material and technique for an optimal peripheral nerve implant with visible results. The authors have shown the use of different aerogel types as a substrate for nerve-like cells in an *in vitro* setting as well as the impact of aerogel topography to neurite extension of PC-12 cells [3] [4] [5] [6]. PC-12 cells are a useful cell line for neurobiological and neurochemical studies because of their similarities with peripheral neuron cells [7]. Shape Memory Polymer Aerogels (SMPA) are a unique and novel aerogel with a thermodynamic-kinetic relationship related to shape recovery rate and elastic modulus [8]. This material provides an innovative new substrate that allows to further investigate the influence of an elastic substrate to PC-12 cells behavior. Consequently, the focus of this investigation is to simultaneously monitor the cell response to SMPA as the substrate is compressed and released during cell culture. This goal is achieved using topographical studies and cell culture of PC-12 cells.

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