

ABSTRACT

Spiders have been walking on the face of this earth for million of years, but very less is known about their silk construction to artificially recreate it. In this thesis, we explore this unexplored field. Using a new technique which can give us a force spectrum analysis of the response to stress, with the precision of 100 nN, we tried to understand the molecular deformation within the spider silk. Unlike many commercially available tensile testers, this new force spectroscopy is simple and versatile. In the scope of this thesis, we disclose various methods and techniques, like force relaxation method in which there is relaxation in the silk when subjected to a constant stress and multi-hysteresis cycle, through which one can get a detailed idea of the molecular deformation of spider silk to model the inside of it. We also explored the oscillation of the capture silk upon subjecting it to high voltage power supply.