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Title:	Fatigueless response of spider draglines in cyclic torsion facilitated by reversible molecular deformation
Authors:	Kumar, Bhupesh (/jspui/browse?type=author&value=Kumar%2C+Bhupesh) Singh, K.P. (/jspui/browse?type=author&value=Singh%2C+K.P.)
Keywords:	Spider draglines Cyclic torsion Macroscopic
Issue Date:	2014
Publisher:	American Institute of Physics
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Abstract:	We demonstrate that spider draglines exhibit a fatigueless response in extreme cyclic torsion up to its breaking limit. The well defined Raman bands at 1095 and 1245 cm ⁻¹ shifted linearly towards lower wavenumbers versus increasing twist in both clockwise and counter-clockwise directions. Under thousands of continuous loading cycles of twist strain approaching its breaking limit, all the Raman bands were preserved and the characteristic Raman peak shifts were found to be reversible. Besides, nanoscale surface profile of the worked silk appeared as good as the pristine silk. This unique fatigueless twist response of draglines, facilitated by reversible deformation of protein molecules, could find applications in durable miniaturized devices.
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