

## Pmma fiber viscoelasticity in extremely low frequency regime - DTU Orbit (09/11/2017)

### Pmma fiber viscoelasticity in extremely low frequency regime

We are reporting on the viscoelasticity of PMMA based Fiber Bragg Grating (FBG) strain sensors when exposed to repeated sequences of long term strain and relaxation with various duty-cycles and frequencies much smaller than 1 Hz. Monitoring the FBG wavelength and how it follows the applied strain, we have shown that after being strained up to 1%, the fiber will rapidly contract elastically to a certain amount after which a viscous-dominated relaxation takes place. The amount of elastic versus viscous relaxation depends both on the level of applied strain and on the duration of the strain. For a big duration of the strain with respect to relaxation, this fast relaxation wavelength range stays almost the same. However, with increasing relaxation duration and keeping the same strain duration, elastic relaxation wavelength range will be shortened for up to 18% (1%) when strained for 0.5% (1%), which could, in certain applications, influence the sensitivity range of sensors based on plastic fibers.

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