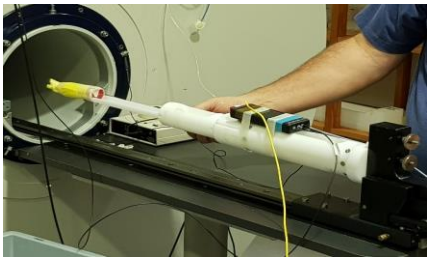
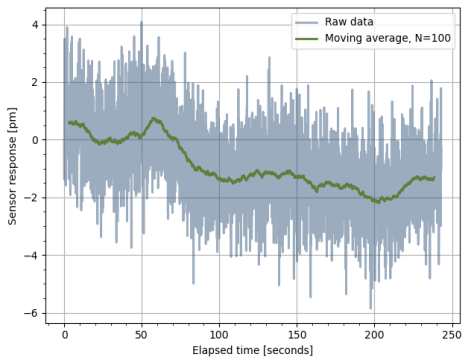
SHUTE Sensing Solutions A/S has developed a monitoring system based on a novel single-mode optical fiber, called a micro-structured Polymer Optical Fiber (mPOF). In order to make the sensing points, a Fiber Bragg Grating (FBG) is inscribed into the mPOF at pre-determined positions. The mPOF sensor is capable of measuring **s**train/stress, **hu**midity and **te**mperature. Made of polymer, it is light weight, hair thin, noncorrosive, nonelectrical conducting, flexible and durable.

Sensing in high magnetic fields

To test this, the SHUTE mPOF sensor was placed into a 9.4 Tesla biospec preclinical MRI Scanner manufactured by Bruker. The test was done at the University of Copenhagen, Panum NMR Core Facility (www.nmr.ku.dk), where several high field strength measurements were conducted with the mPOF inside. The goal of the test was to see if the mPOF could survive the high intensity magnetic fields and whether there was any noticeably signal change during the measurements.





Probe insertions

The mPOF was placed inside a glass tube, which was inserted into a reservoir of water, where a close to constant temperature could be achieved during the measurements. The probe can be seen in the picture to the left, inside the yellow tape at the end of the insertion arm. The probe was insulated with foam to further ensure a stable temperature during the MRI measurements.

Results

During a period of a few minutes, several protocols were run, which exercised the gradient coils with magnetic field strengths up to 1.5 T/m within the static main field of the 9.4 T superconducting magnet. As can be seen in the figure below, the mPOF did not show any decrease in performance during the MRI measurements. There were no sudden jumps or induced noise in the measured sensor response of the mPOF and the signal strength of the sensor remained constant during the insertion into the magnet and the subsequent MRI measurements. The sensor response change of a few picometers is attributed to instrument noise and is considered a normal noise level for these kinds of measurements using a mPOF.

"We have tested the SHUTE mPOF sensor, and found it MRI/NMR compatible, it shows no sign of decrease in performance, when subjected to a gradient coil exercised with magnetic field strengths up to 1.5 T/m within a static main field of a 9.4 T super-conducting magnet. This paves the way for a whole new way of monitoring critical temperature values inside the MRI/NMR scanner environment." says Palle Koch, Engineer, Dept. of Biomedical Sciences, University of Copenhagen.

For more information visit www.shute.dk or feel free to call us on +45 2338 6728 to discuss how SHUTE technology can assist You in optimizing Your sensing requirements.