Biodegradable sensor monitors tendon healing: Page 2 of 2

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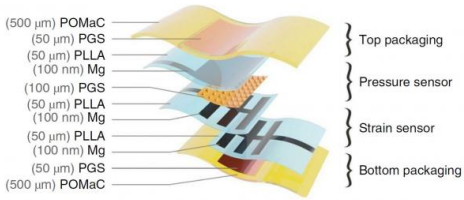

Using stretchable bio-compatible and biodegradable polymers as well as hydrolysable magnesium for the metal electrodes, researchers from Stanford University and the University College London have devised a dual strain and pressure sensor which could be implanted upon reparative surgery, to monitor tendon healing.

Providing independent discrimination of strain and pressure, the laminated sensors were designed to degrade after their useful lifetime, eliminating the need for a second surgery to remove the device. The paper reports a strain sensor designed to operate in the 0-15% strain sensing range, close to the in vivo strain exerted on tendons (under 10%) and capable of discriminating strain as small as 0.4%. The pressure sensor was designed to detect pressures as low as 12 Pa and as high as 430 kPa. The authors also report a response time in the millisecond range as well as an excellent cycling stability for strain and pressure sensing.

The sensor was tested in vitro, with its degradation observed over 8 weeks in a phosphate buffered saline solution at 37°C. It was designed to remain operational in vivo for over two weeks, with in-vivo tests performed subcutaneously on rats. The authors anticipate that such bio-compatible and bio-degradable sensors could find their way beyond orthopaedic rehabilitation monitoring, including as cardiovascular patches and for reconstructive surgery, to monitor the mechanical deformations and pressures in vivo for refined and personalized medicine.

Next, the researchers aim to develop a wireless system made entirely of biodegradable materials, including the circuit used for the wireless transmission of the measured signals though the skin. Last year, Prof. Bao's team had reported biodegradable organic semiconductor devices.

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