

[2017-039]

Stretchable optical fibre



> TRL 4

Problem

Current fibre production methods for stretchable materials are limited by high costs, insufficient versatility, and inadequate performance, particularly in terms of strength, flexibility, and extensibility.

There is a significant need for an innovative production technique that can economically manufacture fibres with enhanced mechanical properties, ensuring they are robust enough for high-stress applications while maintaining safety standards for use in medical devices and everyday products. The challenge is to develop a scalable, cost-efficient process that produces fibres with superior elasticity and durability, meeting the diverse demands of various industries.

Solution

Creating highly stretchable optical fibre using soft polymers enables the detection of different types of deformation with great sensitivity, making them suitable for stretchable uses. Integrating these fibres into clothing would allow them to bend and twist along with body movements without breaking. Fibre sensors made of such flexible materials could enhance existing applications of optical fibre sensing (OFS) technology and introduce new possibilities. There is currently no practical, scalable, and affordable method for producing such flexible fibres.

Stretchable optical fibre offers use of materials with greater elasticity for OFS and overcomes identified issues from current applications:

Polymers with limitations in their elastic thresholds and susceptible to damage, traditional glass OFS and polymer-based OFS have found glass elements to be excessively rigid, leading to potential damage and discomfort due to body movement in stretchable applications.

Potential Commercial Applications

- Application within wearable, implantable, and user-centric devices, thanks to OFS capacity for sensing and signal transmission.
- Devices designed with human interaction in mind, such as prosthetics and exoskeletons, could greatly benefit from the integration of OFS, yielding enhancements in both functionality and comfort, thereby elevating the overall user experience.
- Sectors such as sports and entertainment could exploit the advantages of flexible OFS for monitoring performance and capturing motion.

Intellectual Property Status

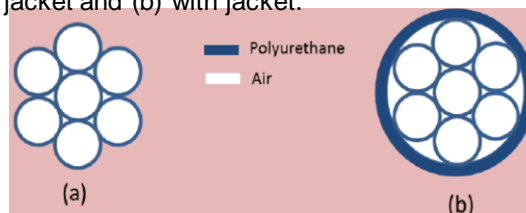
Patent application WO2020041838

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Schematic of a polyurethane fibre (a) without jacket and (b) with jacket.



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