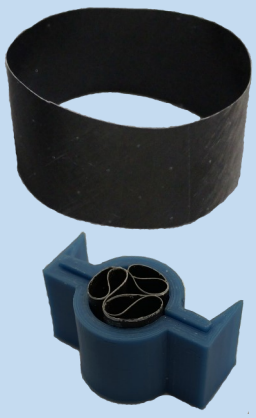
ETH zürich

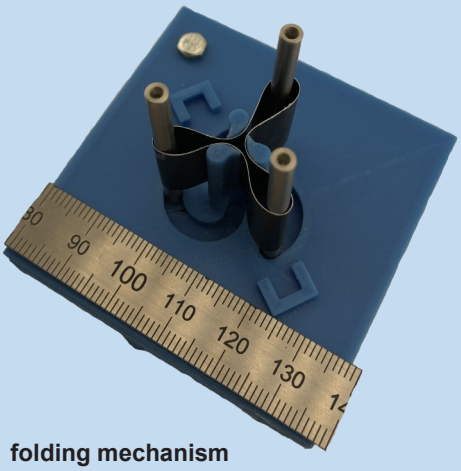
Licensing Opportunity

Expanding, ultrathin, smooth cylinders for implants

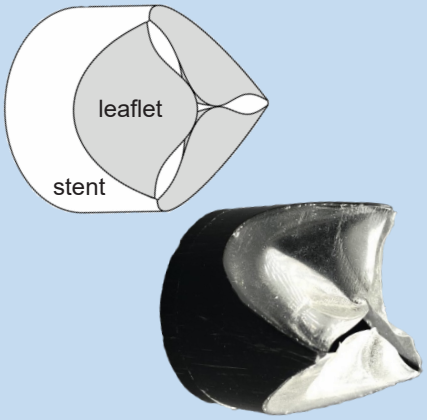


open stent

package



folding mechanism



prototype of stent with leaflets

Summary

Thin shell structures self-deploy at the target position from a 2.5 times smaller package to become durable, well fixed stents.

Background

The method of choice for replacing a heart valve under minimal invasive conditions is the transcatheter aortic valve replacement. Valve and stent are moved inside a 9 mm wide catheter to the spot of the aortic heart valve, which is about 25 mm in diameter. The large change in diameter poses high demands on the engineering of the implant and the choice of material.

Invention

The stent is folded from a round cylinder by pressing inwards at multiple points creating a star-like structure, then bending the tips sideways. This packaging method significantly reduces the diameter. The stent consists of a fibre reinforced polymer, which is a tuneable elastic material. It can be optimized to meet the required fixation forces within a vessel. No significant fatigue phenomena have been observed. Biocompatibility and good bonding to the soft polymer leaflet of the valve are expected.

Features & Benefits

- Self-deployable mechanics
- Tuneable fixation forces inside a confined vessel
- Low manufacturing cost
- Optimized interface to leaflet of the valve for improved durability

Fields of Application

- Trans-catheter heart valve replacement
- Expanding implants

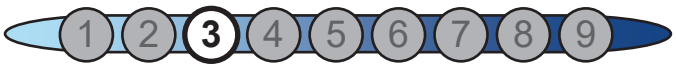
Patent Status

- Patent pending

Publication

- Schlothauer A., Ermanni P., “Stiff composite cylinders for extremely expandable structures”, Sci Rep 9, 15955 (2019) www.nature.com/articles/s41598-019-51529-7

Technology Readiness Level



ETH transfer
transfer@sl.ethz.ch
www.transfer.ethz.ch
+41 44 632 23 82

Reference: 2018-035
Developed by: Laboratory of Composite Materials and Adaptive Structures
Prof. Paolo Ermanni, Arthur Schlothauer