

Title: Auxetic S-Shaped Stent Device

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KEYWORDS: Stent, Auxetic, Coronary, Cardiovascular disease, Poisson ratio

DOMAIN: Mechanical

SUMMARY:

An auxetic structured stent is invented using a biodegradable metal. It is inserted into the blood vessels at diseased sites to improve blood flow and for the treatment of various cardiovascular disorders. The structure has a negative Poisson ratio due to the assembly of the individual S-shaped unit cell. The structure gives rise to improved mechanical property, elimination of stent foreshortening issues, and maintains the patency of the patient's bodily lumen.

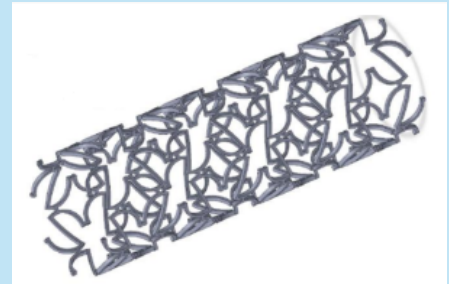


Figure: Auxetic S-shaped stent device.

Structure Pattern of the Stent



- An S-shaped unit cell and its inverted counterpart are connected adjacent to form the initial cylindrical ring.
- A second cylindrical ring inversion of the first ring is capable of radial expansion.
- Linking elements interconnect adjacent cylindrical rings, generating a network of interconnected cells.
- Multiple such pairs of cylindrical rings are employed to construct the radially expandable tubular structure of the stent.

ADVANTAGES:

1. Optimal radial strength, ensuring robust support for diseased vessel walls.
2. Minimal radial recoil post-deployment, maintaining stable support without significant deformation.
3. Resolved foreshortening issues, enabling precise placement and ease of transplantation due to reduced crimped length.
4. With a negative Poisson ratio, it contracts during crimping, facilitating insertion through intricate pathways.

APPLICATION:

1. Stent for Coronary artery blockage.
2. This unique Auxetic S-shaped structure may apply to biomedical implants, automobile, aerospace, and mechanical.

SCALE OF DEVELOPMENT: A functional prototype is available at a lab scale.

TECHNOLOGY READINESS LEVEL: TRL 4

IP STATUS: Indian Patent Application No. 202311040379