論文 / 著書情報
Article / Book Information

Title	A Novel Soft Robot Can Close and Heal Large-Scale Damages Assisted by Thin McKibben Muscles
Authors	Mengfei Xie, Yunhao Feng, Hiroyuki Nabae, Koichi Suzumori
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A Novel Soft Robot Can Close and Heal Large-Scale Damages Assisted by Thin McKibben Muscles

Mengfei Xie, Yunhao Feng, Hiroyuki Nabae, and Koichi Suzumori
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IROS '24 ABU DHABI

Suzumori Endo Lab.

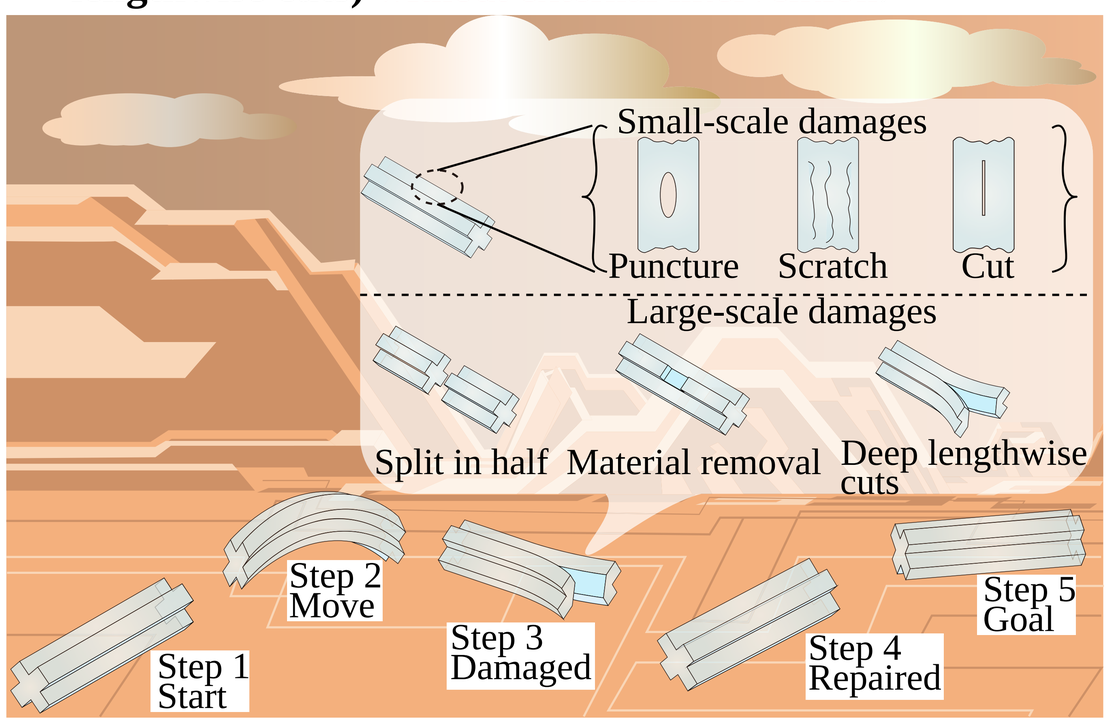
Abstract

A novel soft robot can repair the large-scale damage without external intervention.

Background

For relatively small-scale damages, it can naturally reconnect the cut surfaces, making recovery easy[1], [2].
However, for large-scale damages, naturally rejoining the cut surfaces is difficult[3], [4]. Manual intervention is still required.

➔ **A novel robot that can self-repair two representative large-scale damages (material removal and deep lengthwise cuts) without external intervention.**



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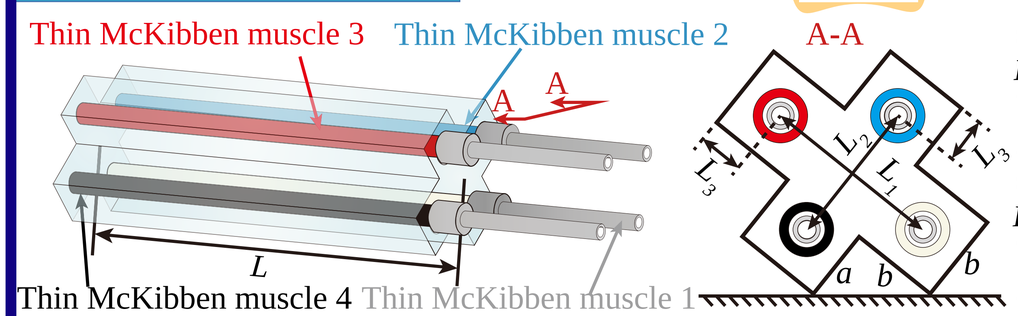
[4] S. K. Tabrizian et al., "Assisted damage closure and healing in soft robots by shape memory alloy wires," Sci. Rep., vol. 13, no. 1, 2023, Art. no. 8820.

Prototype

More information



L [mm]	L_1 [mm]	L_2 [mm]
100	20	16

L_3 [mm]	a [mm]	b [mm]
5	8	10

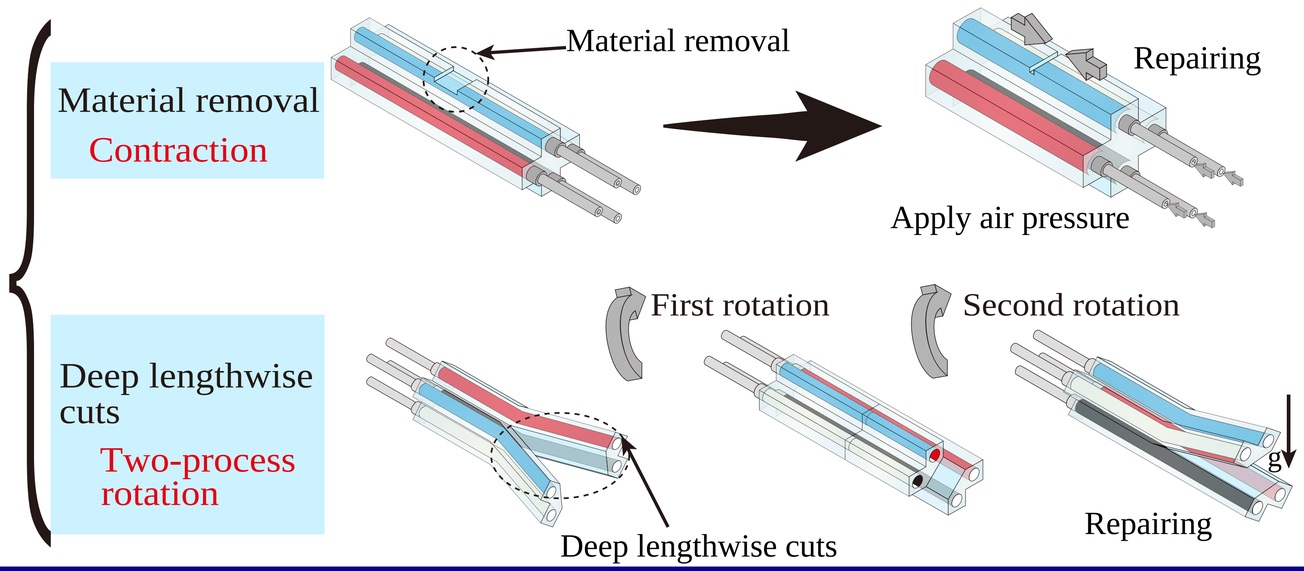
Thin McKibben muscle (SM 40, s-muscle)

Self-healing material (WIZARD GEL®, yoshiro)

* From: https://www.yushiro.co.jp/products/wizard

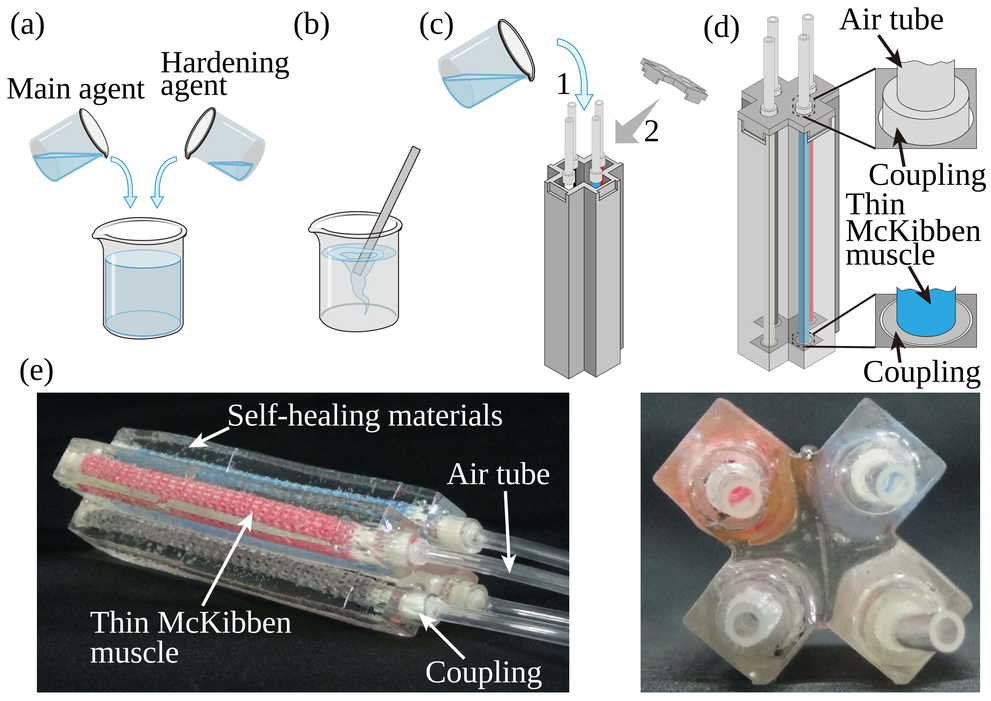
Items	Typical values
Appearance	transparency
Time of healing	24 h
Hardness	40 point
Tensile strength	0.24 MPa
Elongation	600~1000%
Dry resistance	6 months
Durability temp.	-18℃~105℃

Close and heal large-scale damages

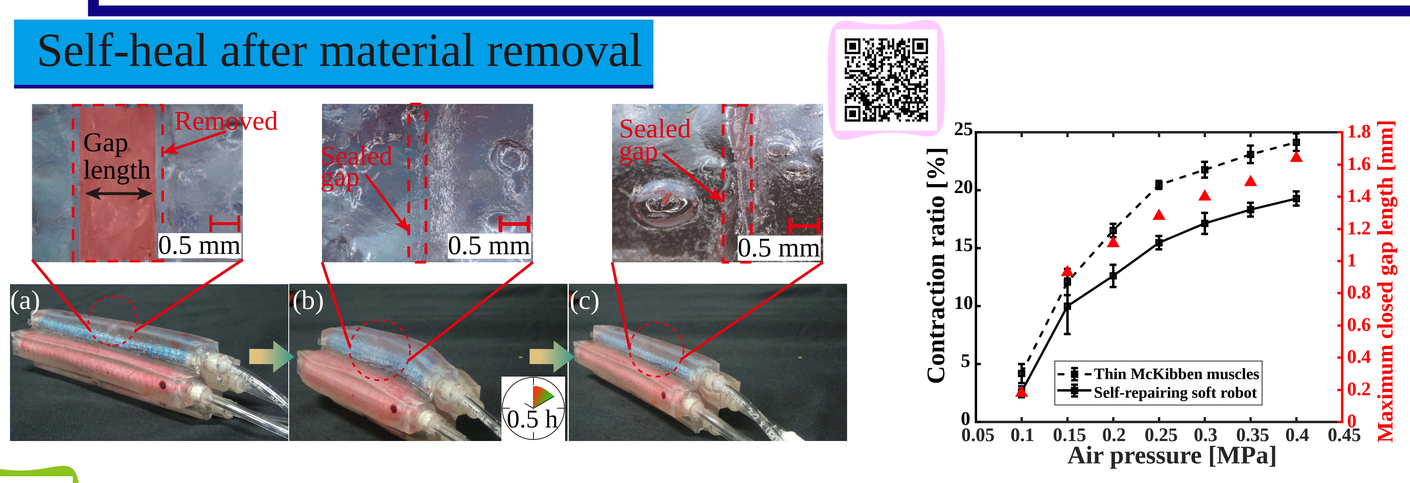


Demonstration

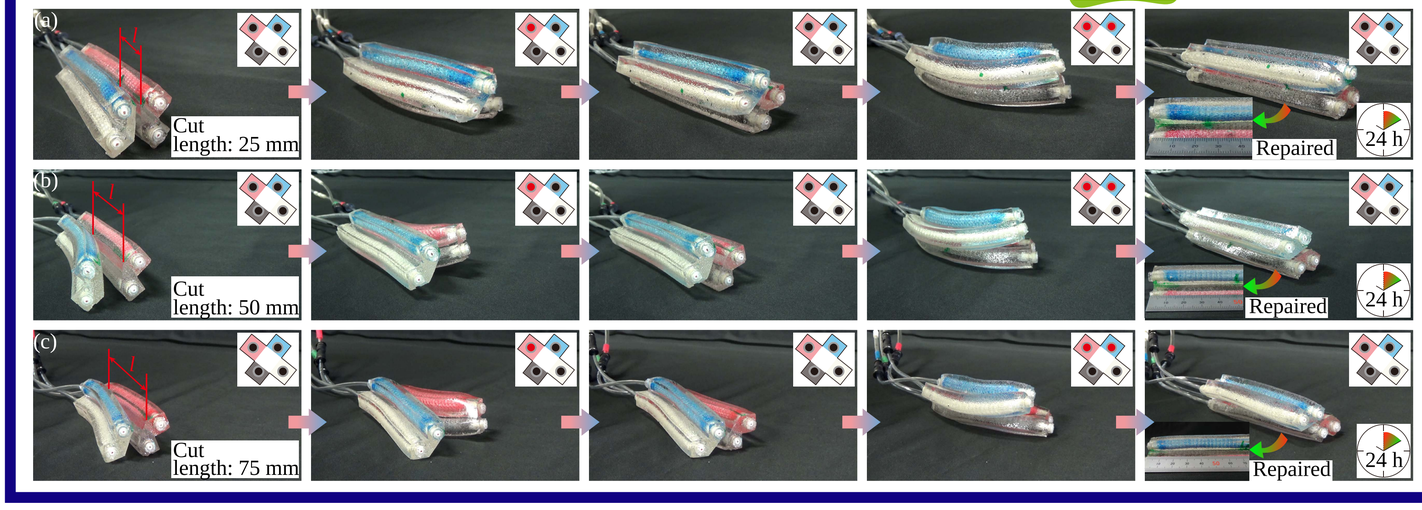
Fabrication process

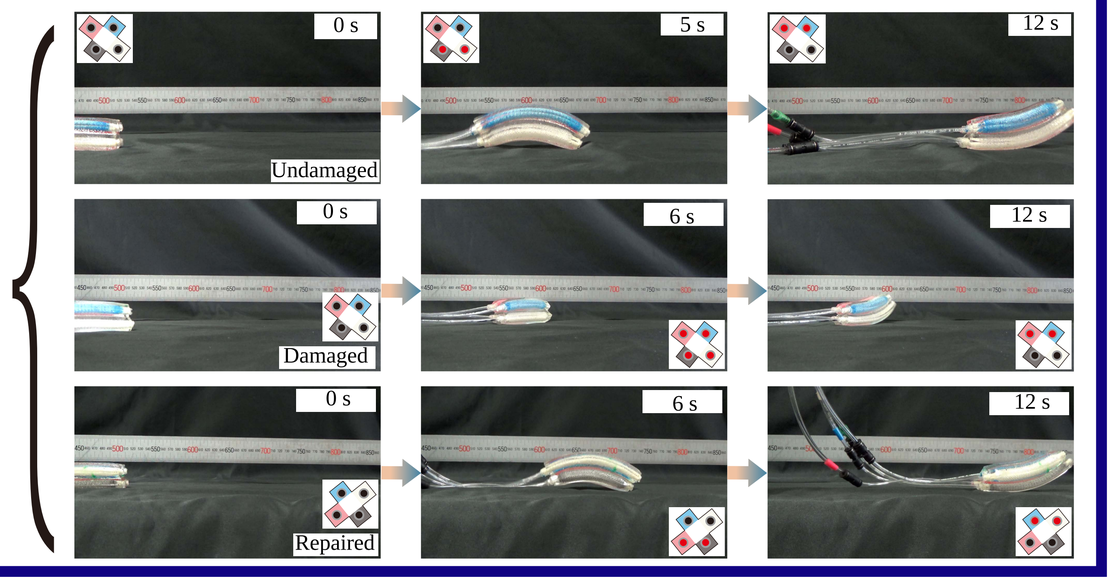


Self-heal after material removal



Self-heal after deep lengthwise cuts





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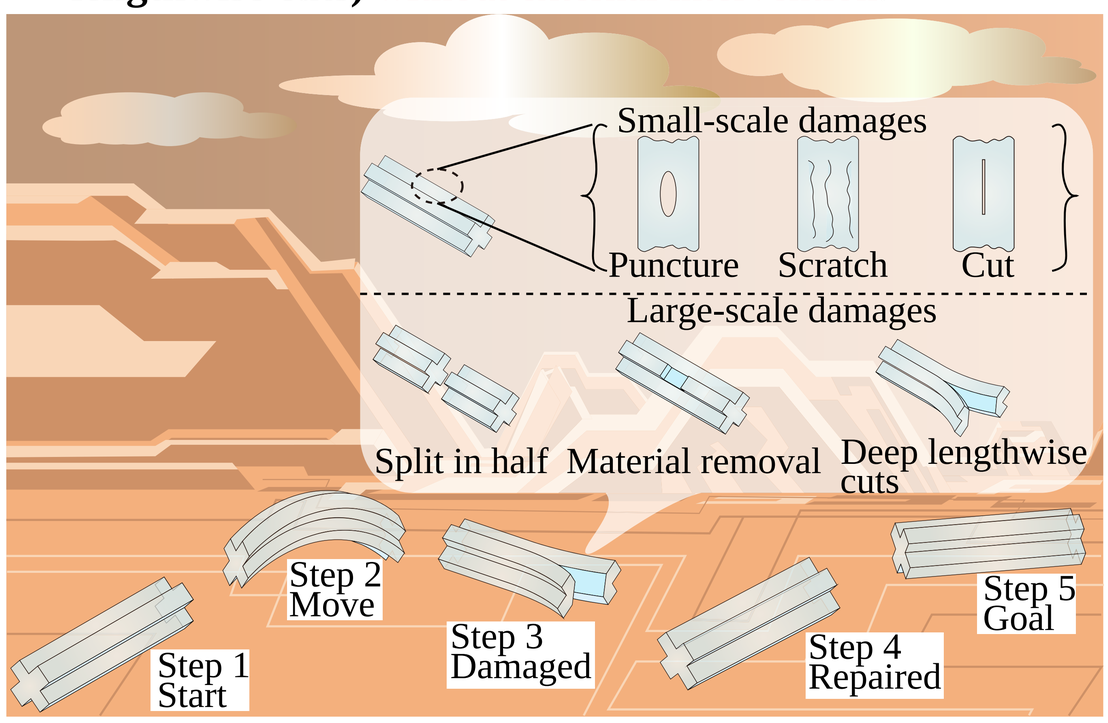

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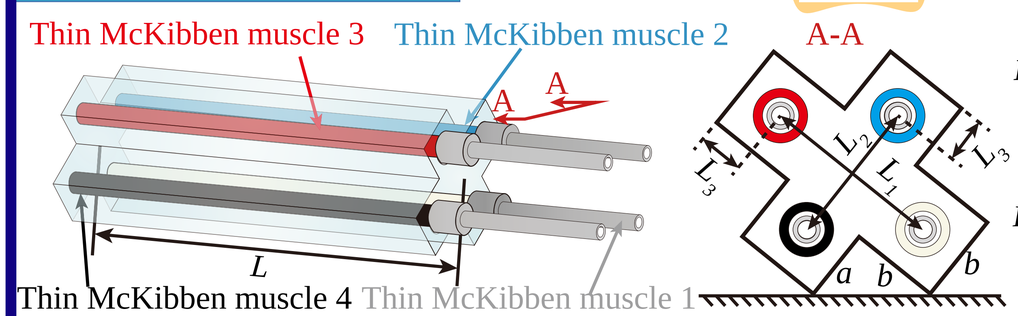

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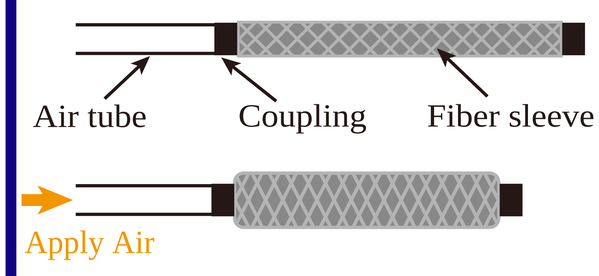

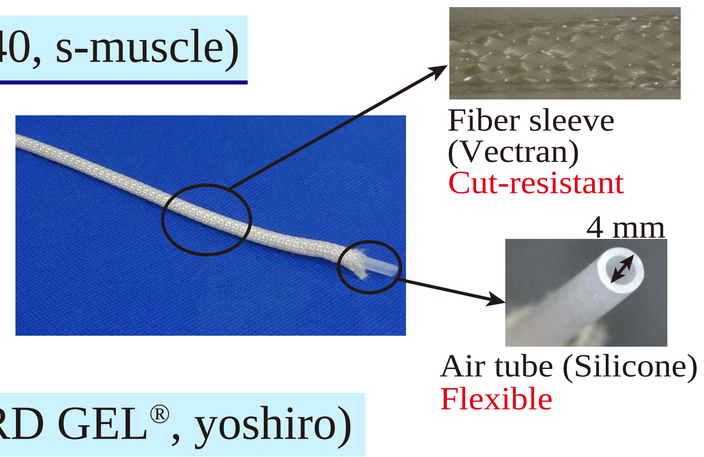

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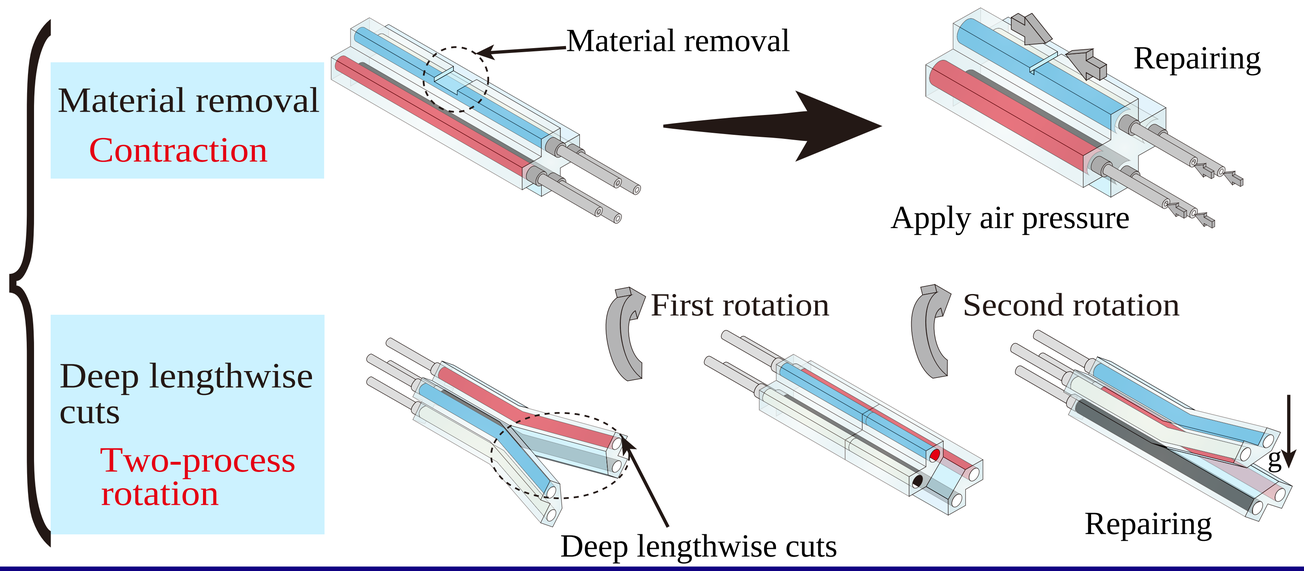

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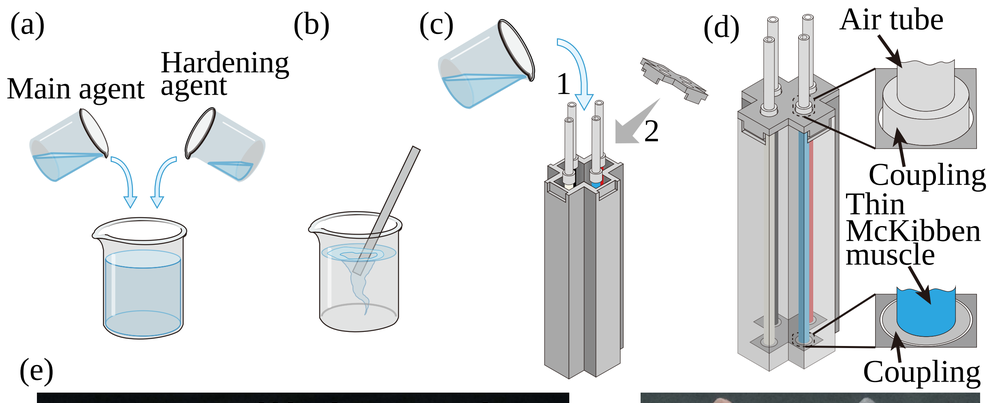
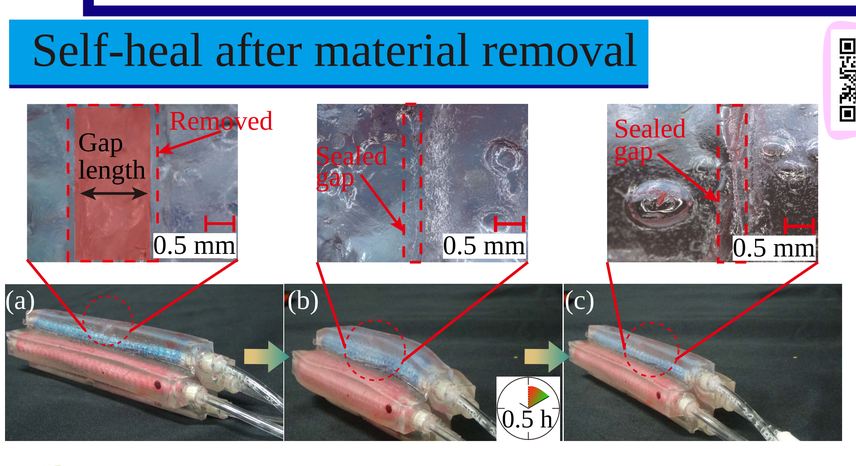
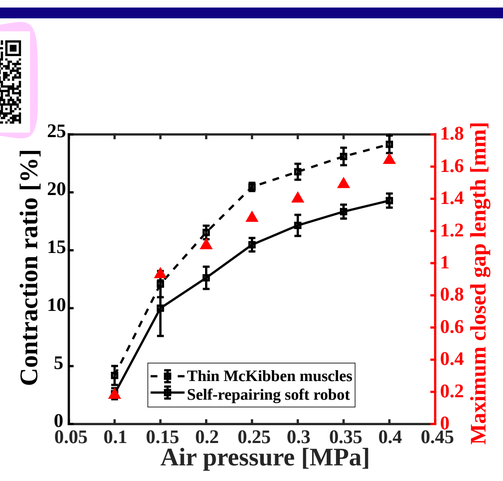


Self-heal after material removal





Self-heal after deep lengthwise cuts