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标题: Bioinspired fiber-regulated composite with tunable permanent shape and shape memory properties via 3d magnetic printing

作者: Ren, LQ (Ren, Luquan); Li, BQ (Li, Bingqian); Song, ZY (Song, Zhengyi); Liu, QP (Liu, Qingping); Ren, L (Ren, Lei); Zhou, XL (Zhou, Xueli)

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摘要: Shape memory polymers (SMPs) generally change shape from a temporary state to a permanent state, and the permanent shape is only determined by its initial form, which leads to the lack of design freedom for SMPs. In order to enrich morphing behavior and extend applications of SMPs, bioinspired design and fabrication methods need to be developed. Many biological dynamic materials enable shape changes ranging from bending, twisting to spiraling using site-specific aligned cellulose microfibers orientations. Here, we proposed an approach integrating bioinspired fiber architectures and varying 3D printing parameters into SMPs, to achieve tunable permanent shape and shape memory properties. The self-folded flower and sequentially deployed smart robotic hand have been developed to demonstrate the feasibility of our method. The proposed bioinspired SMPs, which is rarely seen in the previous reports, have intriguing fundamental properties and hold great potential for applications in soft actuators, smart textiles, wearable equipment, medical devices, and other intelligent apparatus.

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地址: [Ren, Luquan; Li, Bingqian; Song, Zhengyi; Liu, Qingping; Ren, Lei; Zhou, Xueli] Jilin Univ, Minist Educ, Key Lab Bion Engn, Changchun 130022, Jilin, Peoples R China.
[Ren, Lei] Univ Manchester, Sch Mech Aerosp & Civil Engn, Manchester M13 9PL, Lancs, England.

通讯作者地址: Liu, QP; Ren, L (通讯作者)，Jilin Univ, Minist Educ, Key Lab Bion Engn, Changchun 130022, Jilin, Peoples R China.

电子邮件地址: liuqp@jlu.edu.cn; lei.ren@manchester.ac.uk

作者识别号:

作者	Web of Science ResearcherID	ORCID 号
ren, luquan	AAB-3592-2020	

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