亮点报道：折纸超表面：开启全息电磁新视界——可重构折纸手性响应的创新突破

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随着信号处理和成像系统对电磁波动态操控需求的持续攀升，探寻新型可重构超表面技术迫在眉睫。折纸艺术，利用折纸原理通过简单的机械操作改变超表面电磁特性。它在工程、材料等多领域的成功应用，为超表面设计带来全新思路。

空军工程大学人工结构功能材料研究团队及其合作者，研究聚焦于利用 Miura-ori 折纸实现可重构手性响应，进而推动全息成像与信息加密技术发展。研究团队巧妙地将 Rosenfeld 原理与 L-和 D-金属手性对映体集成于 Miura-ori 表面，精心设计单元结构。在平面状态下，折纸超表面能实现全息加密；而在特定折叠条件与频率的自旋圆偏振波驱动下，可在指定焦平面上重建具有圆二色性的多路全息图像。他们在实验中成功重构出在 f=16.7 GHz 时的字母“N”(LCP 入射) 和“I”(RCP 入射) 图像，“N”和“I”图像的成像模式效率分别达到 41.79% 和 55.20%，峰值信噪比分别为 7.63 和 9.52，充分证明了该折纸超表面在全息成像与信息加密方面的有效性。

这种折纸形式突破了传统超表面设计的局限，为自旋选择性系统、伪装及信息加密提供了新颖且有效的解决方案，在信息安全和目标干扰等领域有着很有前景的应用。

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Highlights: Origami metasurfaces: Unveiling a new horizon in holographic electromagnetics-innovative breakthroughs in reconfigurable origami chiral responses

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As the demand for dynamic manipulation of electromagnetic waves in signal processing and imaging systems continues to rise, it is urgent to explore new reconfigurable metasurface technologies. Origami art, leveraging the principles of paper folding, can change the electromagnetic properties of metasurfaces through simple mechanical operations.

The research team on artificial structured functional materials from the Air Force Engineering University and their collaborators have focused their research on achieving reconfigurable chiral responses using Miura-ori origami, thereby promoting the development of holographic imaging and information encryption technologies. In the experiments of this paper, the images of the letters "N" (under LCP incidence) and "I" (under RCP incidence) at f=16.7 GHz were successfully reconstructed. The imaging mode efficiencies of the "N" and "I" images reached 41.79% and 55.20% respectively, and the peak signal-to-noise ratios were 7.63 and 9.52 respectively, fully demonstrating the effectiveness of this origami metasurface in holographic imaging and information encryption.

This form of origami breaks through the limitations of traditional metasurface design, offering novel and effective solutions for spin-selective systems, camouflage, and information encryption.

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