

Structural Coloration in Polypeptide Liquid Crystal

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Cholesteric liquid crystals (CLCs), characterized by their helical periodic arrangement, have been widely used to create structural coloration, where the periodicity can be precisely tuned to selectively reflect specific wavelengths based on Bragg's law of diffraction.^[1] Naturally derived polymeric materials such as DNA, cellulose, chitin, and some proteins exhibit cholesteric phases with specific handedness—proteins typically adopt right-handed helices, while cellulose derivatives favor left-handed helices—due to the naturally selected chirality of their monomeric units. Because of naturally abundance and sustainability, cellulose has been widely used as the structural coloration materials.^[2, 3] However, polypeptides and proteins, as another catalog of the sustainable materials, have not been extensively explored,^[4] especially for their structural coloration potential. Here, we present a synthetic polypeptide-based CLC system capable of switching the handedness of the reflected light by modifying the chirality of the polypeptide, offering a novel approach to sustainable structural coloration materials.

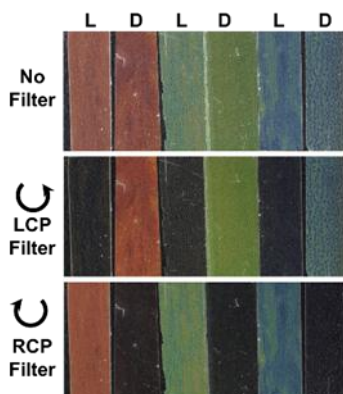


Figure 1. Polypeptide structural coloration reveal tunable coloration and refractive handedness of circular polarization light.

References

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