

## Supplementary information

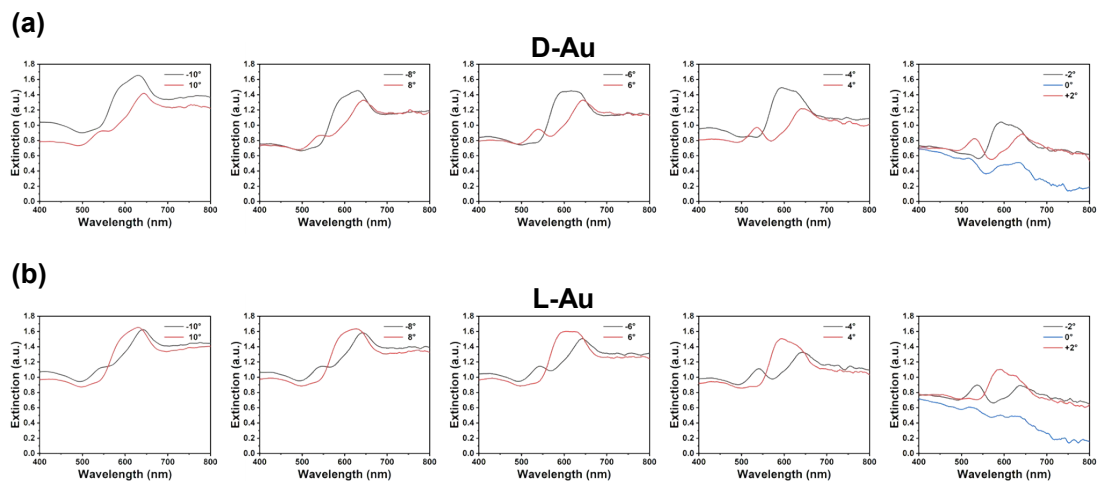
# **Patternable chiral Au nanocrystal-doped composite films for information encryption: The role of optical rotation**

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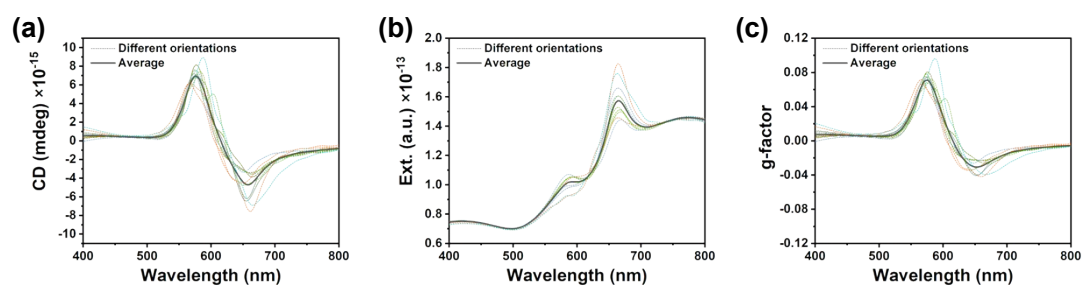
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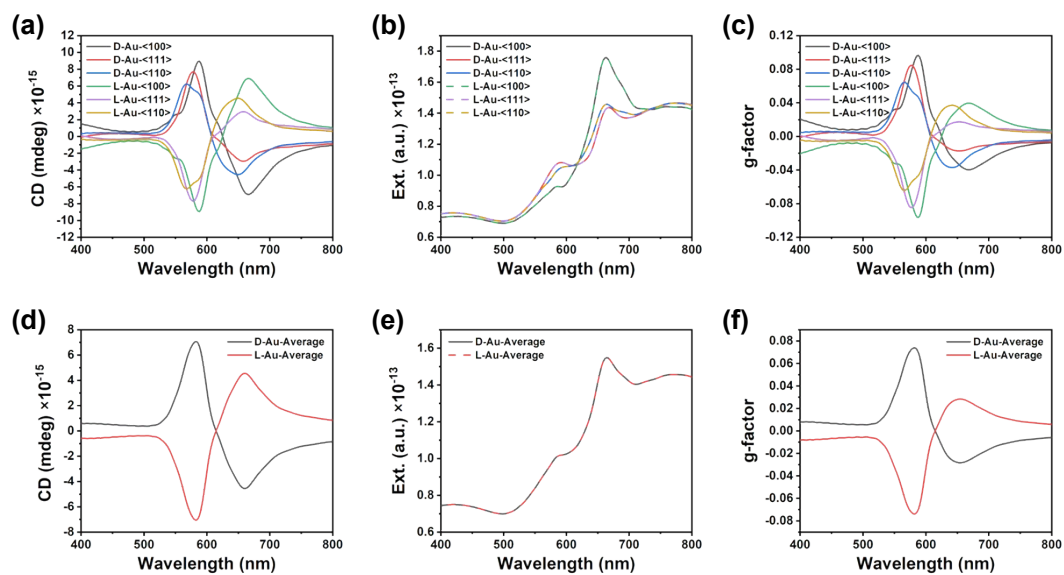
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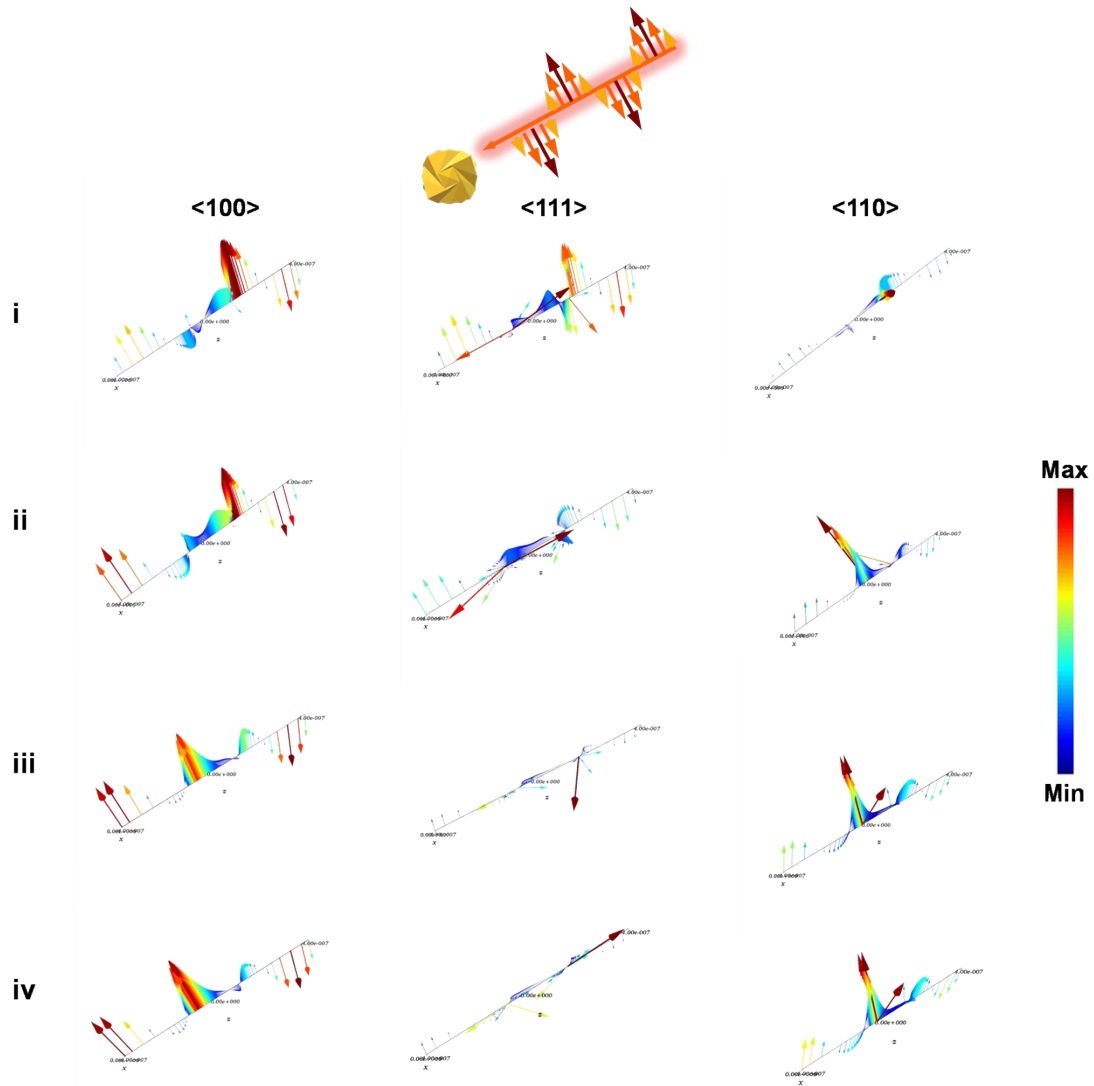
**Fig. S1** The polarization-dependent extinction spectra of the (a) D-Au, and (b) L-Au nanocrystal solutions, recorded at detection angles ranging from  $-10^\circ$  to  $10^\circ$  in  $2^\circ$  increments.



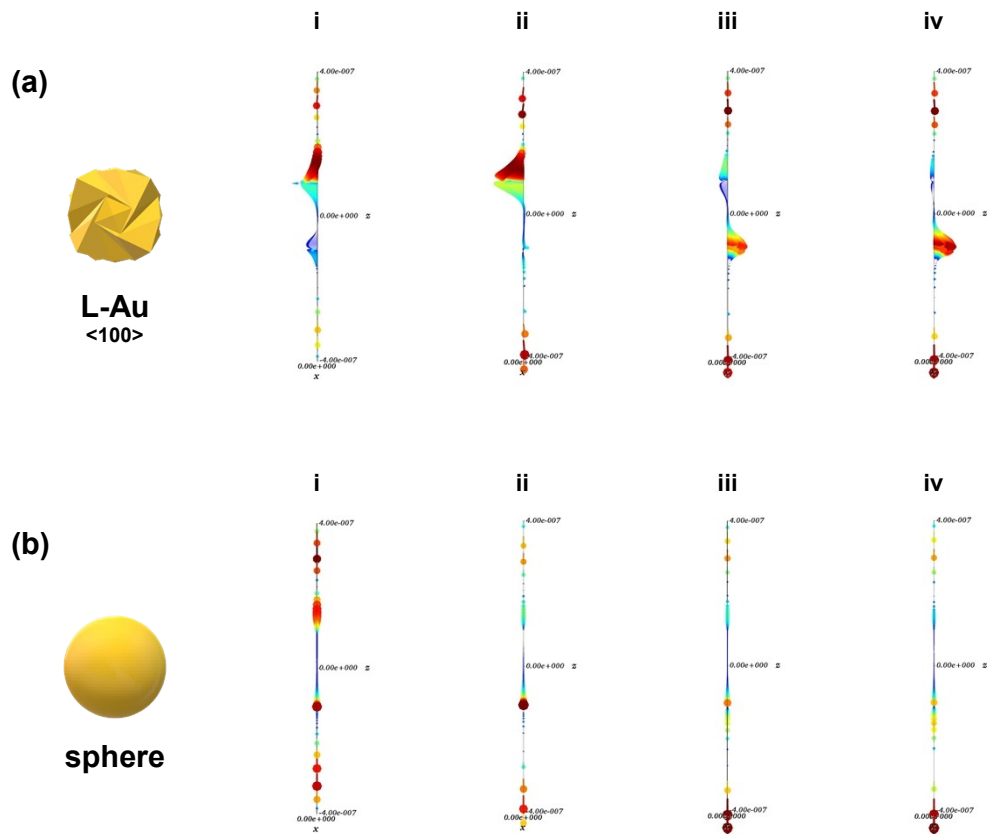
**Fig. S2** Calculated (a) CD, (b) extinction, and (c) g-factor spectra of a single D-Au nanocrystal from 84 orientations (dash line), and the corresponding average spectrum (solid line).



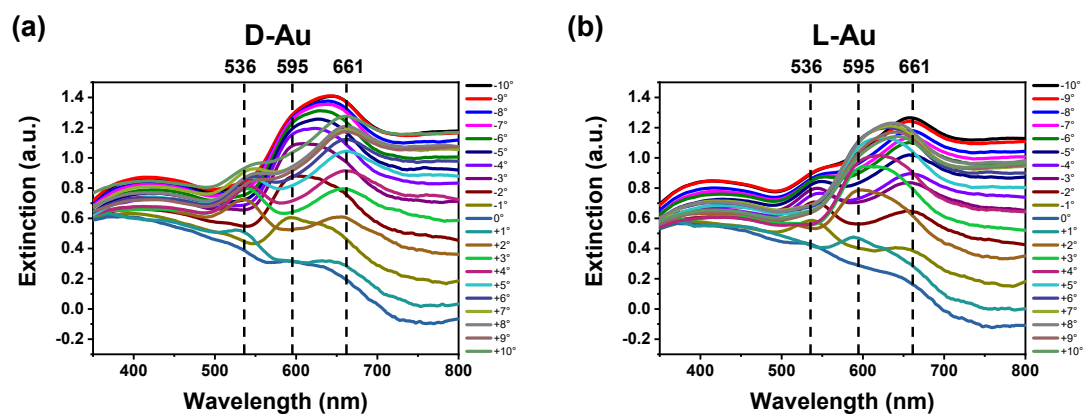
**Fig. S3** (a-c) Calculated (a) CD, (b) extinction, and (c) g-factor spectra of a single D-Au and a single L-Au nanocrystal from the  $\langle 100 \rangle$ ,  $\langle 111 \rangle$ , and  $\langle 110 \rangle$  directions, respectively. (d-f) Calculated average (d) CD, (e) extinction, and (f) g-factor spectra of a single D-Au and a single L-Au nanocrystal from the  $\langle 100 \rangle$ ,  $\langle 111 \rangle$ , and  $\langle 110 \rangle$  directions.



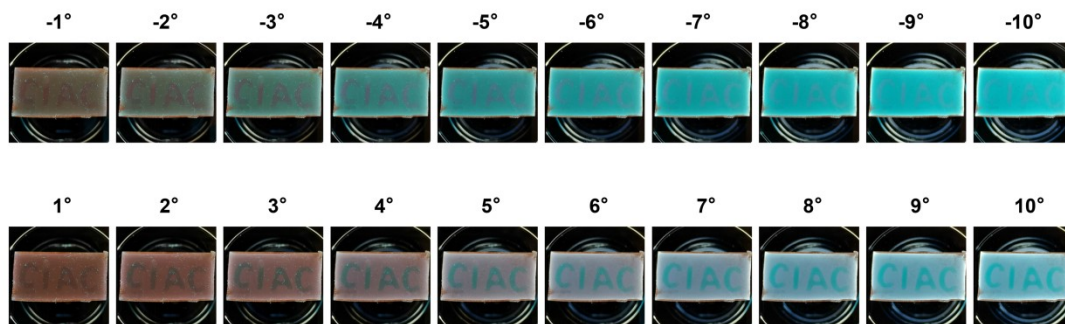
**Fig. S4** The tilted ( $45^\circ$ ) images of the polarization vector states of a linearly polarized light (with a polarization vector perpendicular to the paper) as it passes through a single D-Au nanocrystal at (i) 576 nm, (ii) 615 nm, (iii) 658 nm, (iv) 665 nm.



**Fig. S5** The polarization vectors of a linearly polarized light (with a polarization vector perpendicular to the paper) as it passes through (a) a single L-Au nanocrystal, and (b) a single sphere with a diameter of 190 nm at (i) 576 nm, (ii) 615 nm, (iii) 658 nm, (iv) 665 nm.



**Fig. S6** The polarization-dependent extinction spectra of PDMS films doped with (a) D-Au, and (b) L-Au nanocrystals. The detection angles are between  $-10^\circ$  and  $10^\circ$  in increments of  $1^\circ$ .



**Fig. S7** The polarization-dependent images of the encrypted substrate between  $-10^\circ$  and  $10^\circ$  in increments of  $1^\circ$ .