Supporting Information for

Cracking enabled unclonability in colloidal crystal patterns authenticated with computer vision

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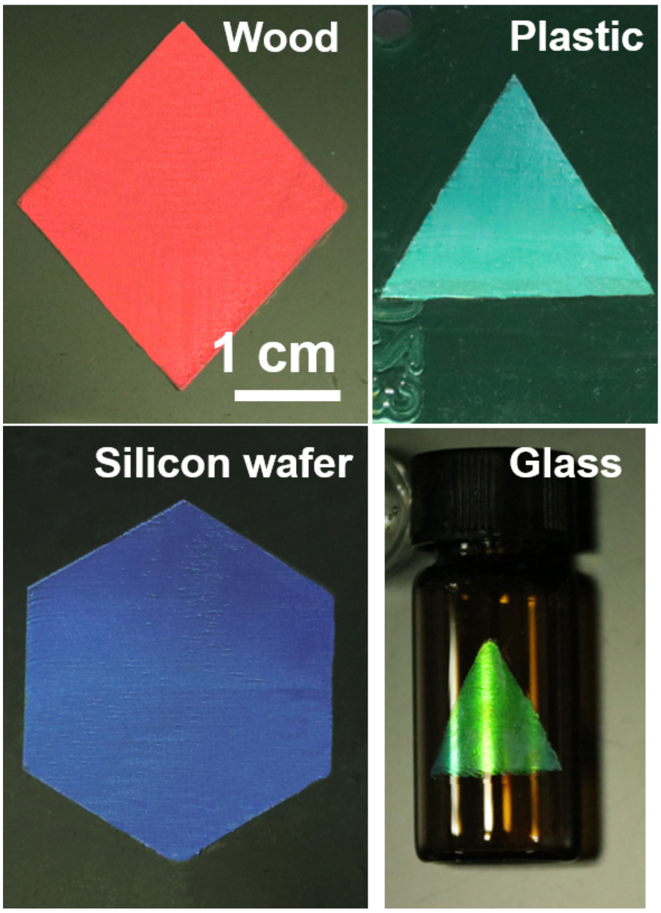

Fig. S1. Photos of the patterned colloidal crystal films assembled on wood, plastic silicon wafer and glass bottle surfaces.

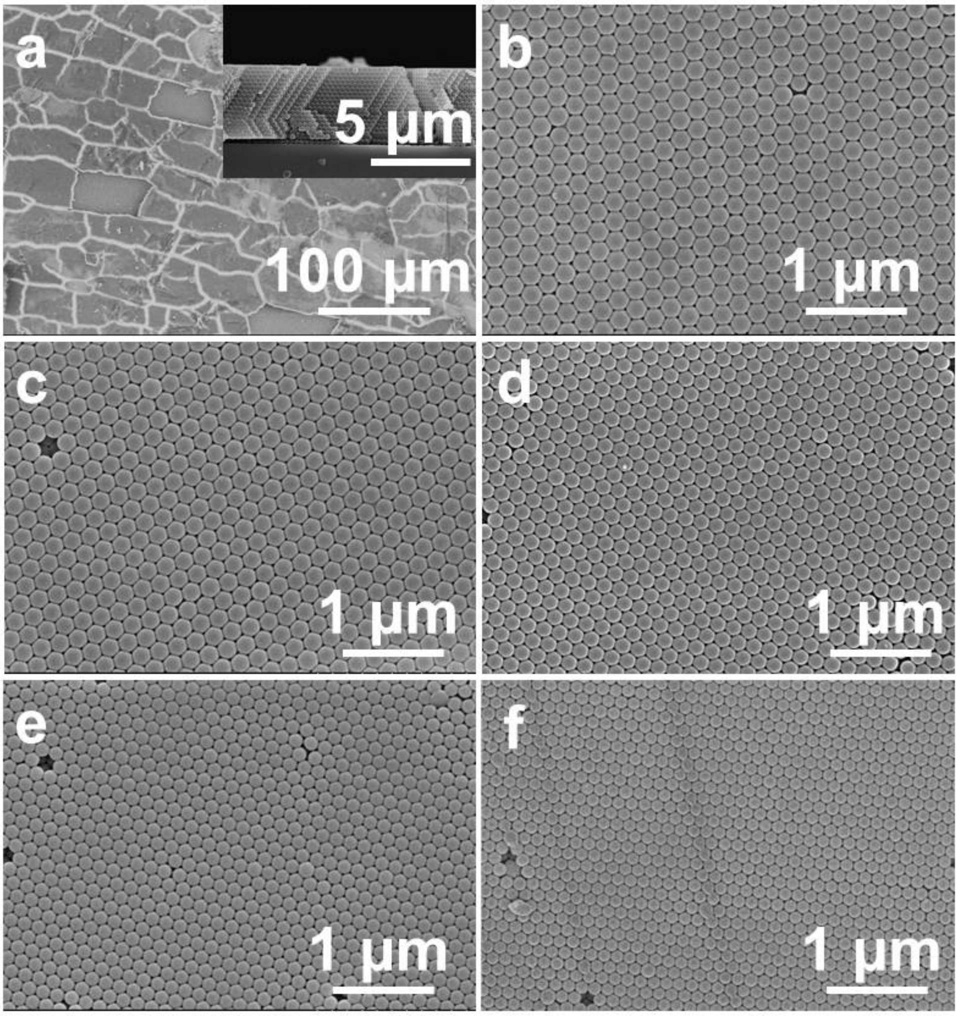

Fig. S2. SEM images of the colloidal crystal films assembled with monodisperse P(St-MMA-AA) particles of varying sizes to produce the rich color hues. The low magnification image showed obvious irregular micro-cracks and the high-resolution image demonstrated well-ordered periodic arrangement of the nanospheres. The inset in (a) shows the cross-sectional SEM image of the colloidal crystals.

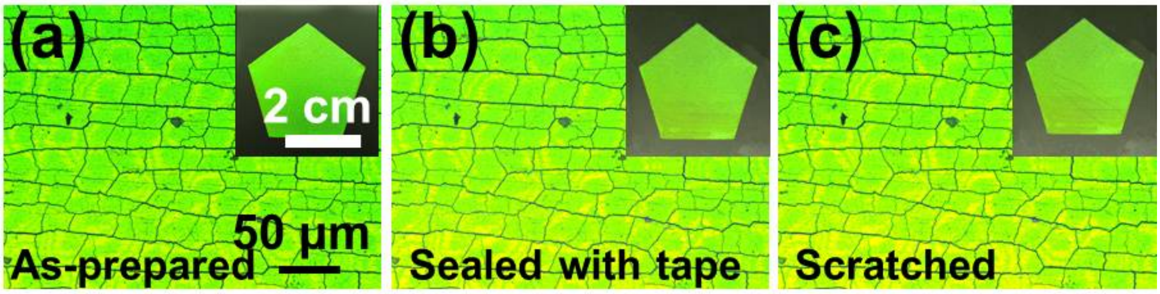

Fig. S3. Optical microscope images of the colloidal crystal patterns with PUF of (a) the as-prepared film, (b) after being covered with a transparent tape and (c) after being further scratched using a pencil. The insets are the corresponding photos of the colloidal-crystal films. The stability of the colloidal-crystal patterns with PUF could be improved by facilely covering them with transparent tape, while not influencing the cracking “fingerprints” of the colloidal crystals.

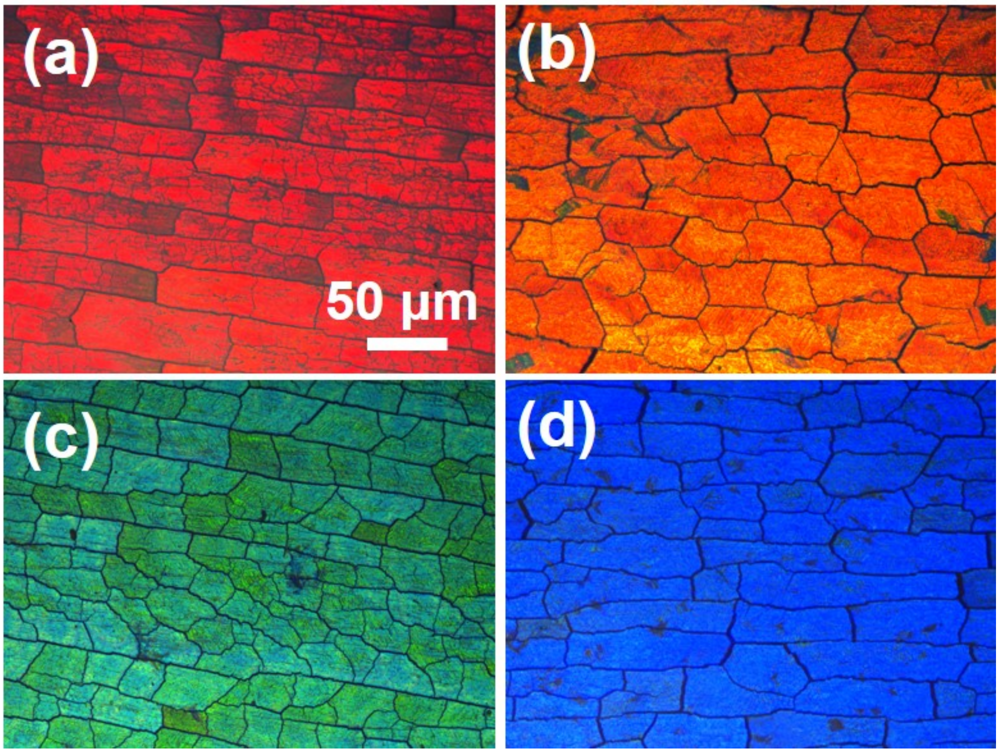

Fig. S4. Optical microscope images of the colloidal crystals with red (a), orange (b), cyan (c) and blue (d) structural colors.

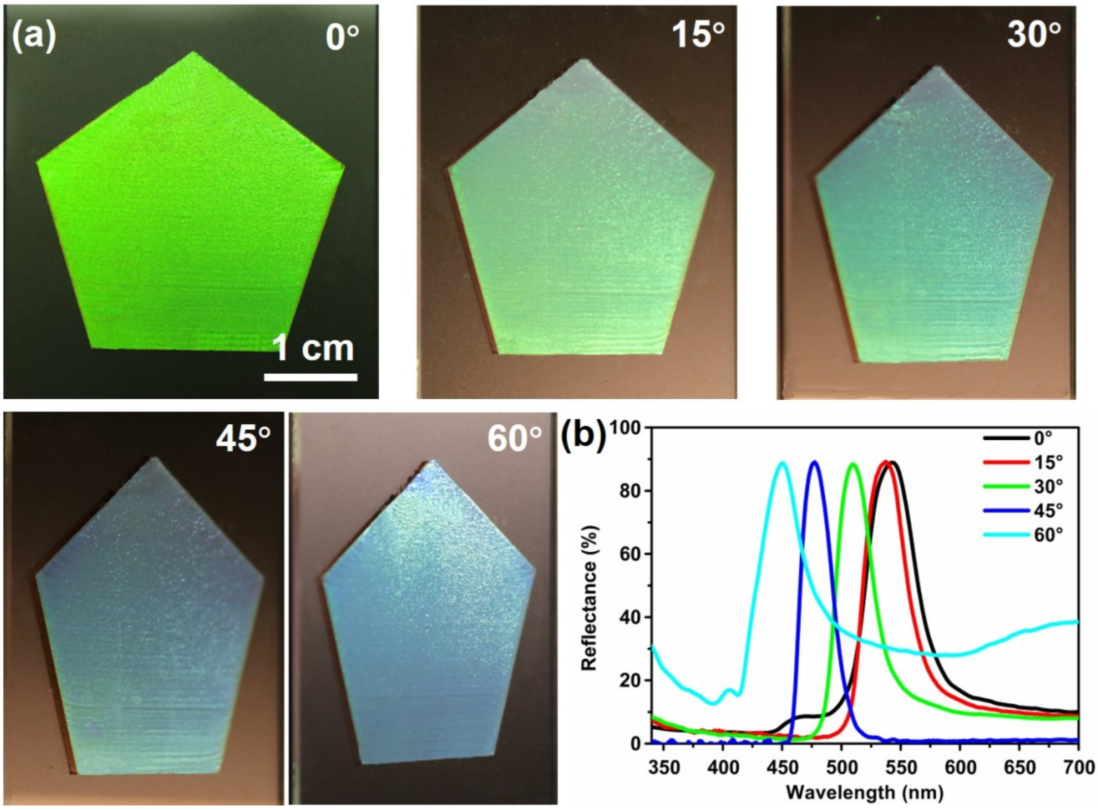

Fig. S5. (a) Digital photographs and (b) the reflectance spectra of the colloidal crystal film assembled with monodisperse P(St-MMA-AA) nanospheres with the size of ~228 nm at viewing angles from 0° to 60°.

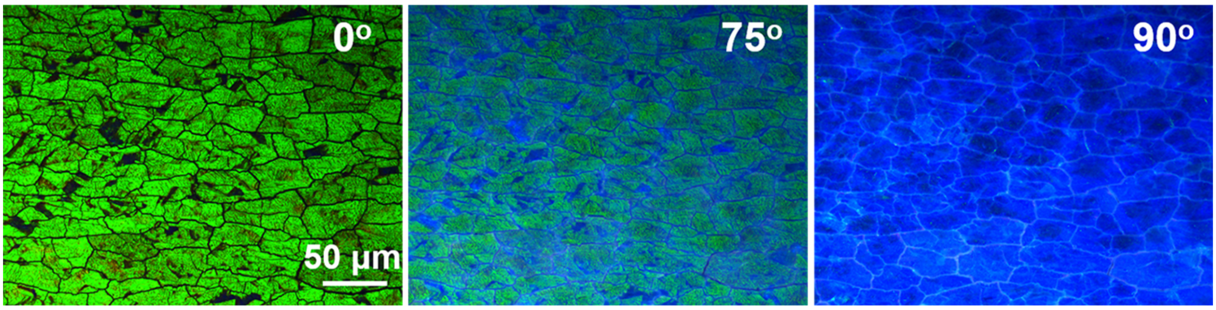

Fig. S6. Optical microscope images of the colloidal crystal film under cross-polarized light. Colloidal crystal film demonstrated polarization anisotropy.

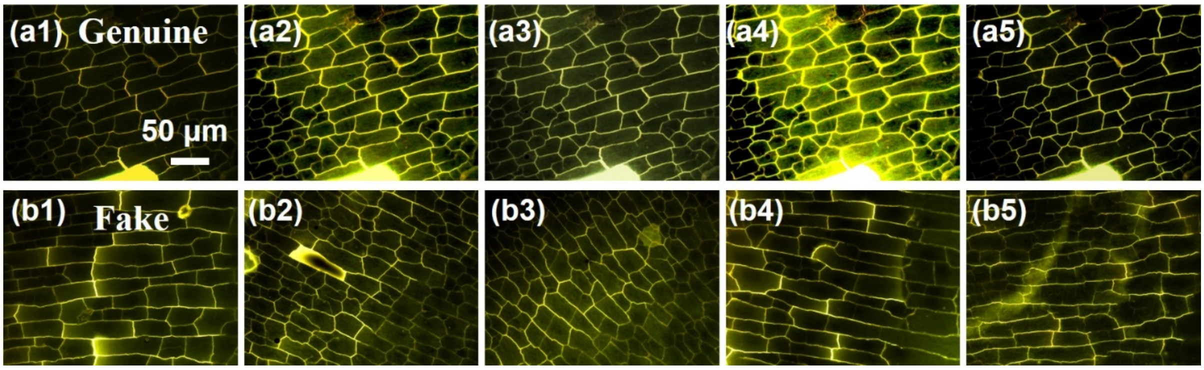

Fig. S7. Fluorescent optical microscope images of the colloidal crystals under UV light with varying photographing habits, the micro-crack edges of which were extracted to produce the samples for authentication of a(1-5) genuine samples (Fig 4c) and b(1-5) fake samples(Fig. 4d).

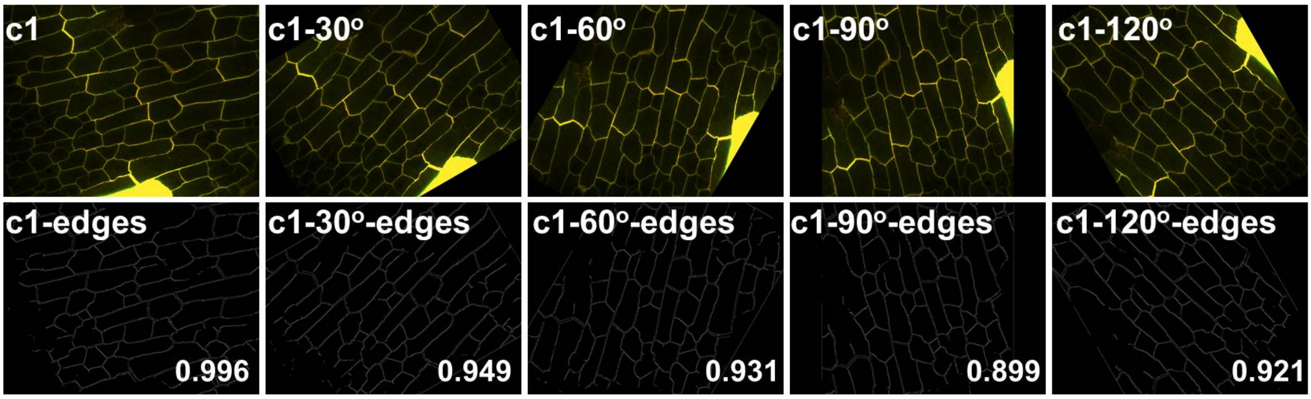

Fig. S8. Fluorescent optical microscope images of the colloidal crystals under UV light taken after being rotated every 30°, the micro-crack edges of which were extracted to produce the samples for validation test. The inset numbers indicate the identical rates with Fig. 4b1.