

## SUPPORTING INFORMATION

# Strain-Multiplexing Optical-Tuning based on Single-Pulsed Holographic Nanostructures

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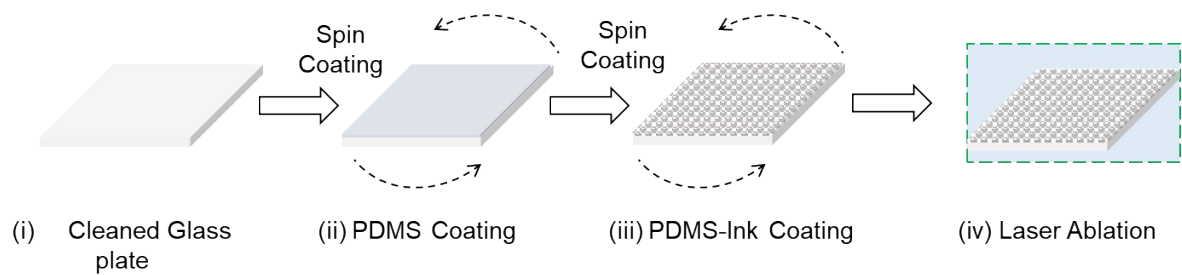
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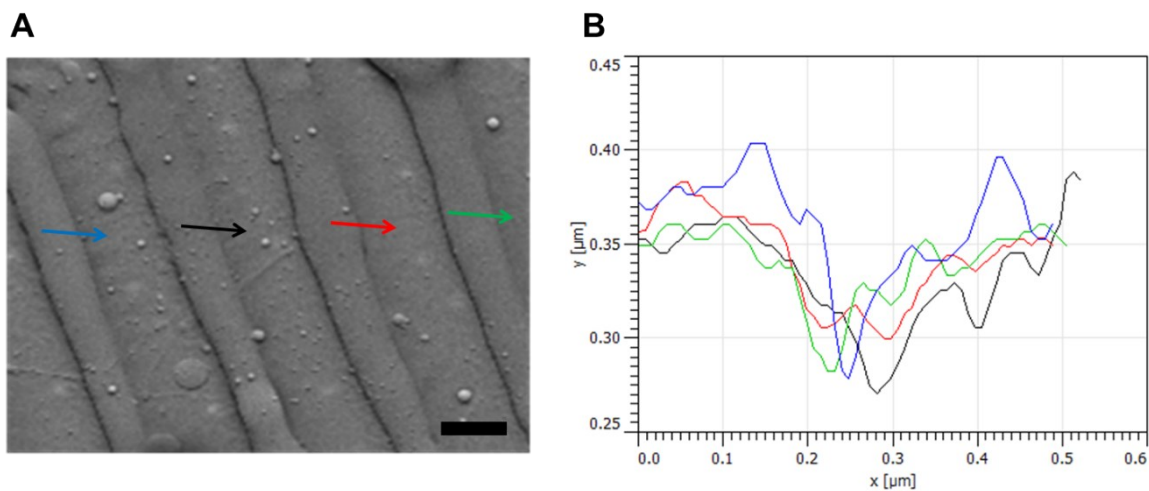
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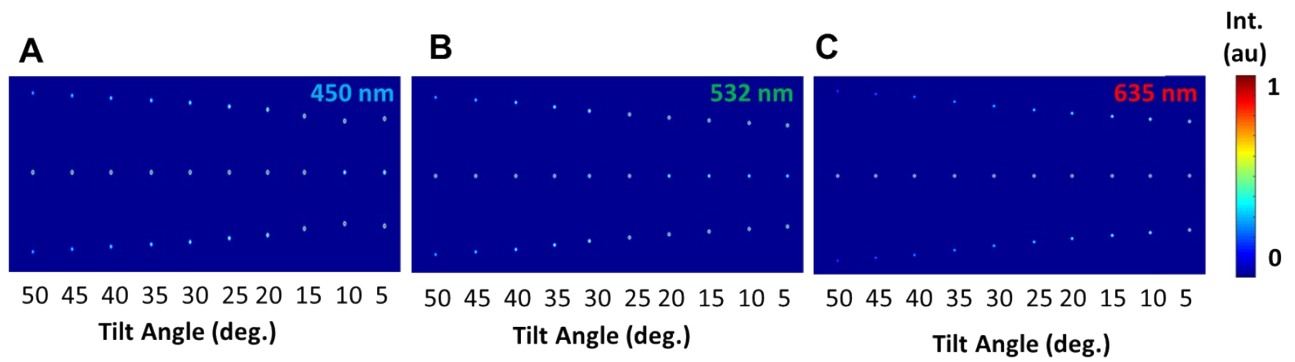
\* These authors contributed equally



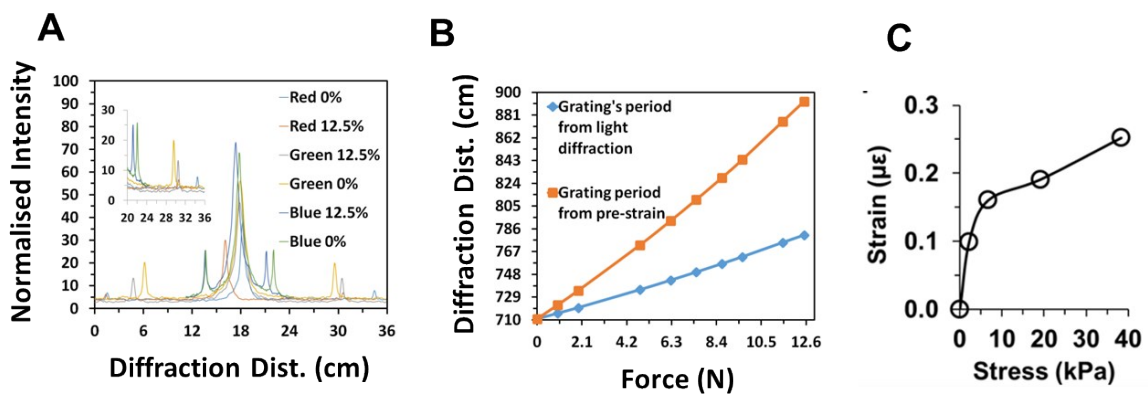
**Figure S1.** (i-iv) PDMS-Ink HMM surface preparation and laser ablation.



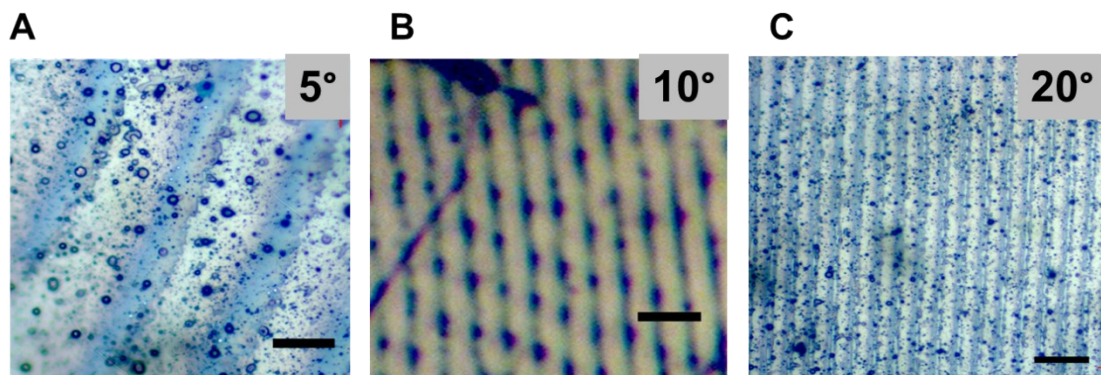
**Figure S2.** A, B SEM image of PDMS-Ink HMM sample and grating height variations. Scale = 400 nm.



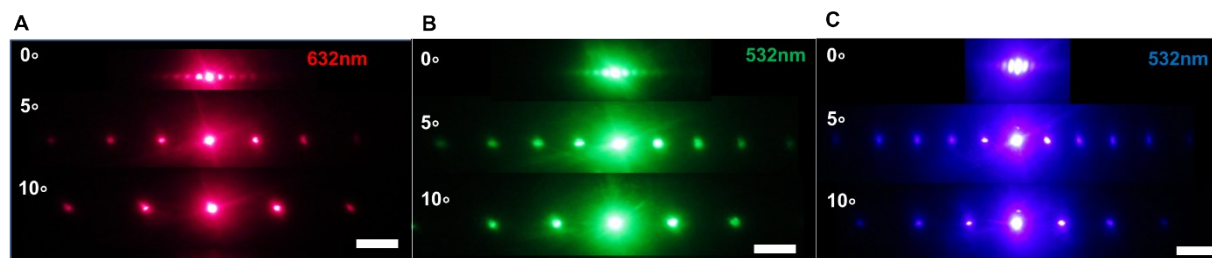
**Figure S3.** A-C Computational modelling of diffraction distance variation with laser interference tilt angle (deg.) variations.



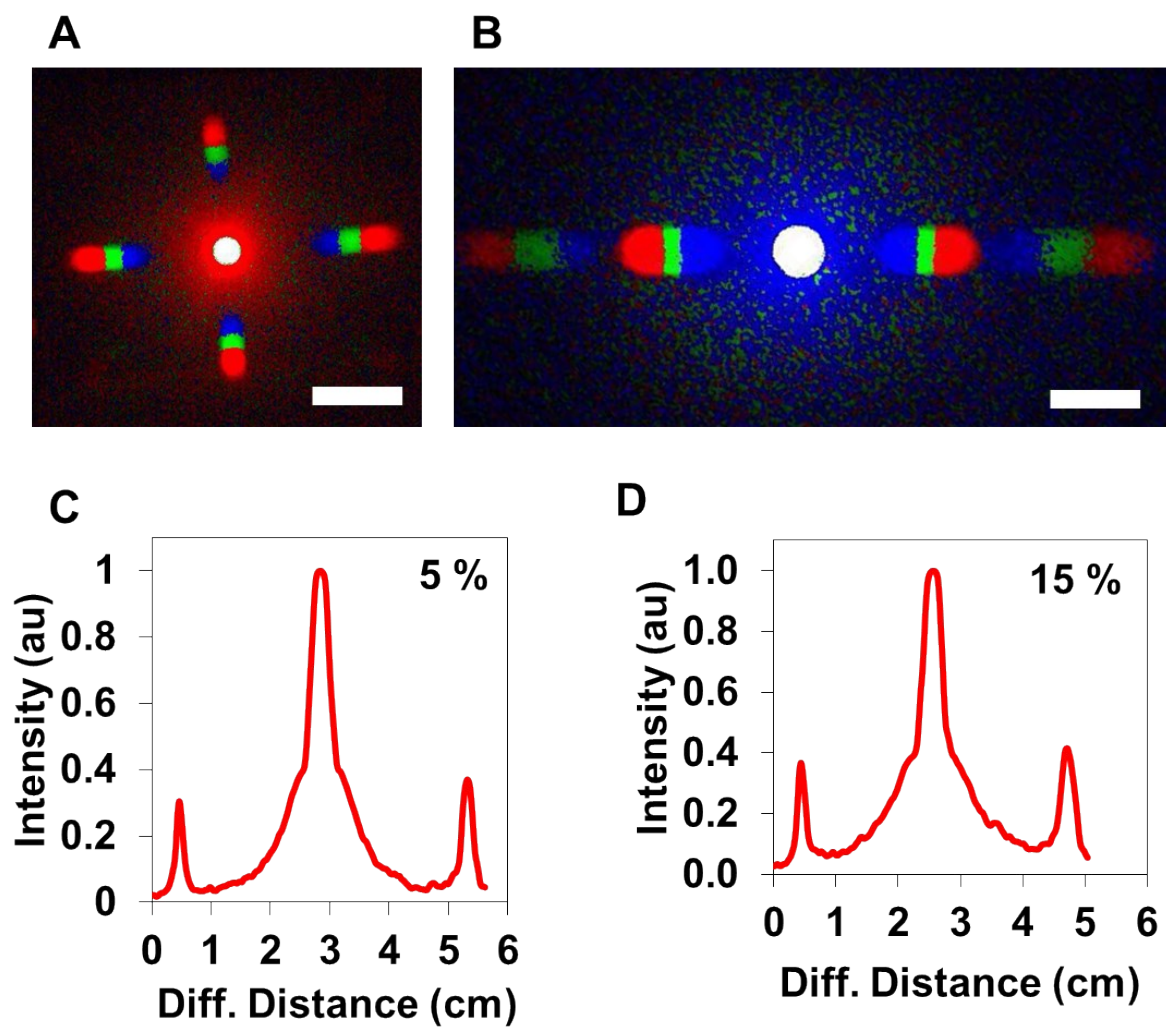
**Figure S4.** **A** Diffraction intensity as a function of diffraction distance. **B** Diffraction distance with applied strain. **C** Strain as a function of stress.



**Figure S5.** Optical microscopic image of Ink grating sample. Scales = 5  $\mu\text{m}$ .

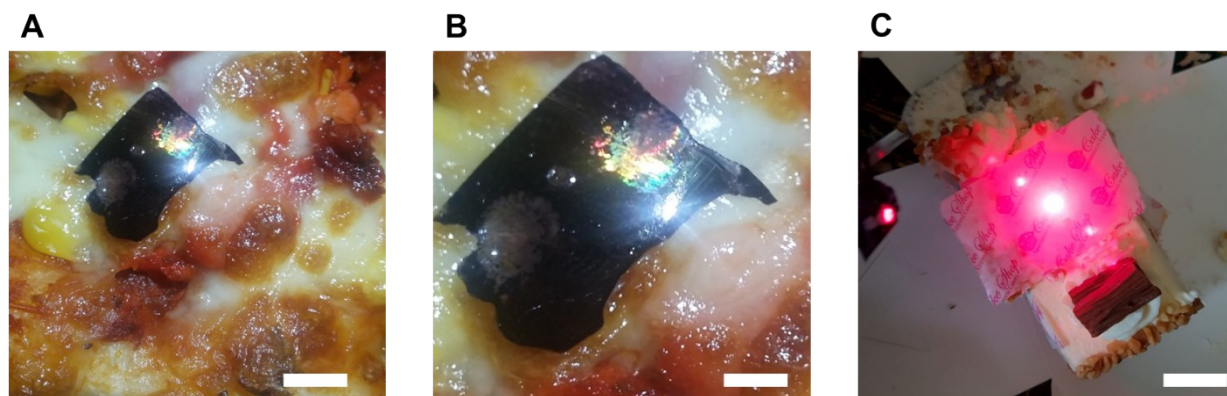


**Figure S6.** A-C Diffraction distances variation with tilted angle variations (0-10°). Scales = 2.5 cm.

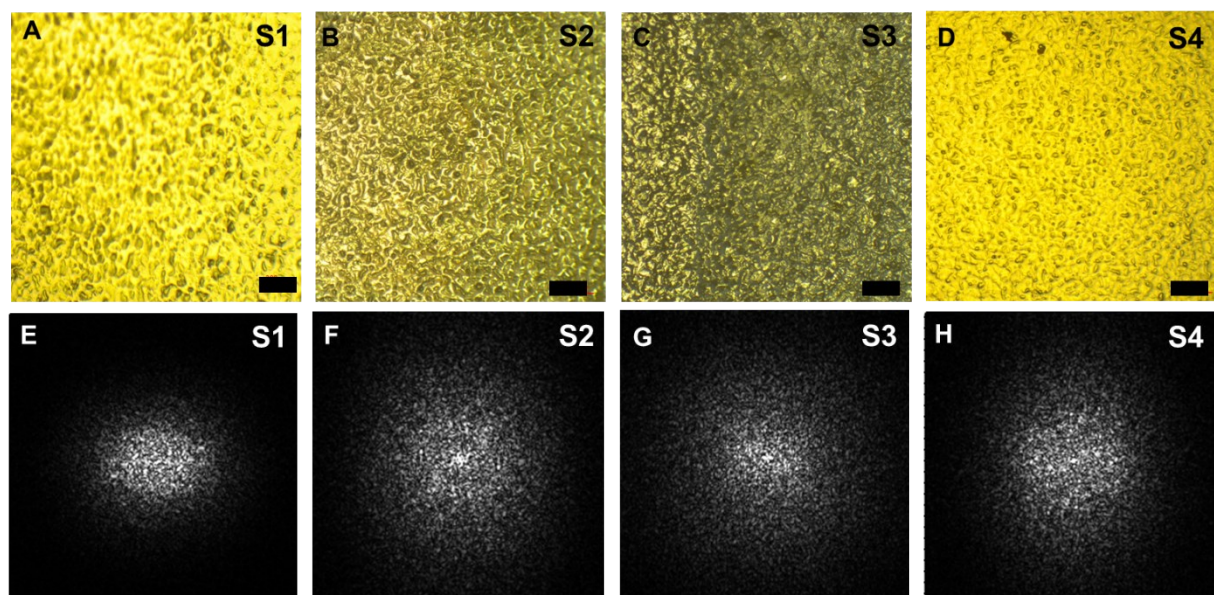


**Figure S7.** (A, B) Broadband light diffraction of HMM square and parallel grating surface. (C, D) Diffraction intensity profile with applied strain (5 %, 15%). Scales = 2.5 and 1.0 cm.

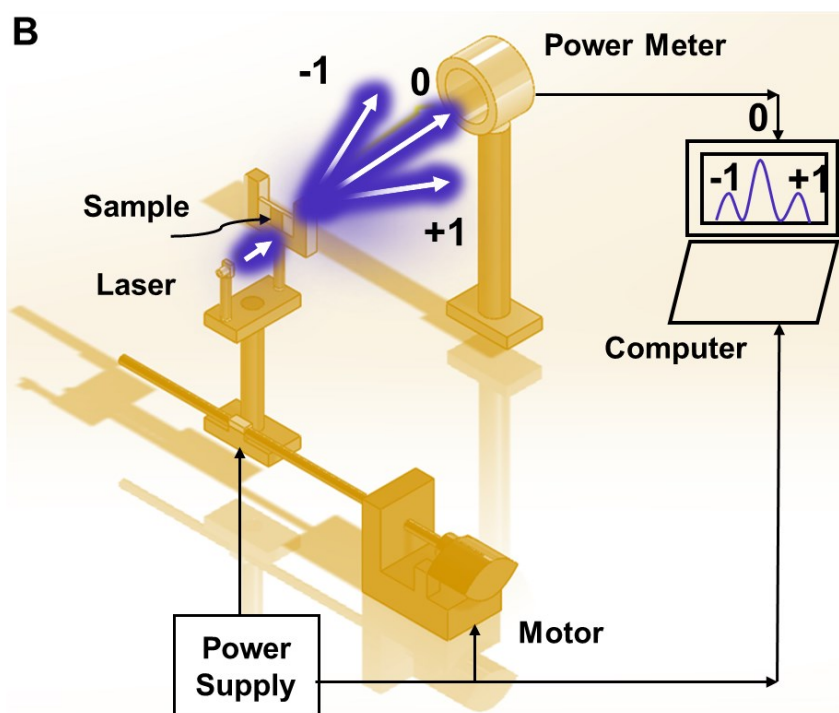
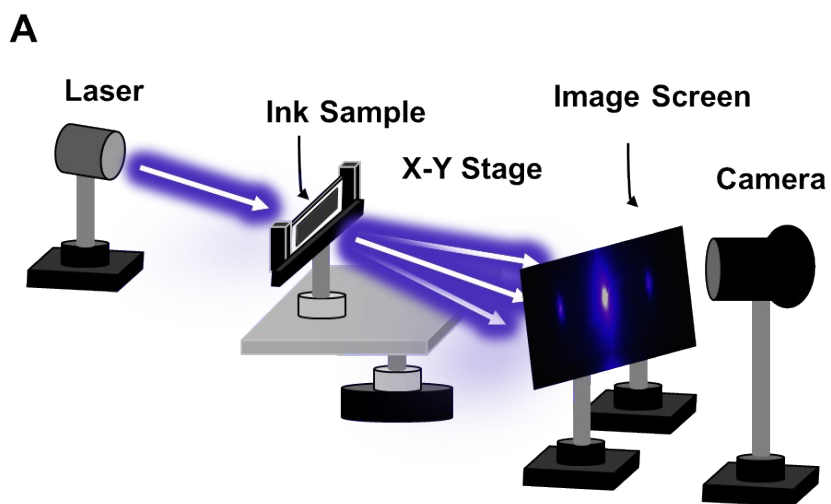




**Figure S8.** A-C Gelatin-ink grating for food decoration and light diffraction property. Scales = 5 cm.



**Figure S9.** A-B Optical microscopic image and FFT of HMM diffuser (PDMS-Gold) S1-S3 with laser ablation energy (90 to 320 mJ/cm<sup>2</sup>). Scales = 200  $\mu$ m.



**Figure S10.** **A** Far-field light-scattering captured through an image-screen setup. **B** Light-scattering measurement through an angular setup.