Life Sciences

Researchers Realize Full-color Printing with Single Transparent Ink

Color plays an important role in daily life and modern industry. Generally, color is generated by dyes or pigments rather than the transparent materials, and people have to use multiple inks to achieve different colors. However, a recent study by Institute of Chemistry of the Chinese Academy of Sciences(ICCAS) broke this cognition.

The study, published in *Science Advances*, achieved the full-color structural-color printing with a single transparent polymer ink.

This structural color is arisen from the domed microstructure (microdome), which can manipulate the total internal reflections (TIRs) and interference of light.

To precisely construct the optical microstructure with well-controlled morphology, researchers developed a digitally controlled inkjet printing method named droplet by droplet printing.

They directly printed the transparent polymer ink with accurate volume on a hydrophobic and transparent substrate. Under the surface-tension effect, the ink droplets would retract into perfect microdomes automatically. The inverted microdomes can induce the interference color from TIR and serve as independent pixels to create the structural color. By changing the ink volume, the microdome morphology and the optical path could be precisely controlled. Thus, full-color pixels across the whole visible regions were easily obtained with one printing nozzle and one transparent ink.

Besides the microscale pixel, full-color structural-color images were also prepared by the digital programmable printer. The gamut, lightness, saturation, and grayscale of the printed image could be systematically controlled with single-pixel precision.

This color printing method could be fully compatible with the commercial printing technology and suitable for the large-area industrial production.

(ICCAS)

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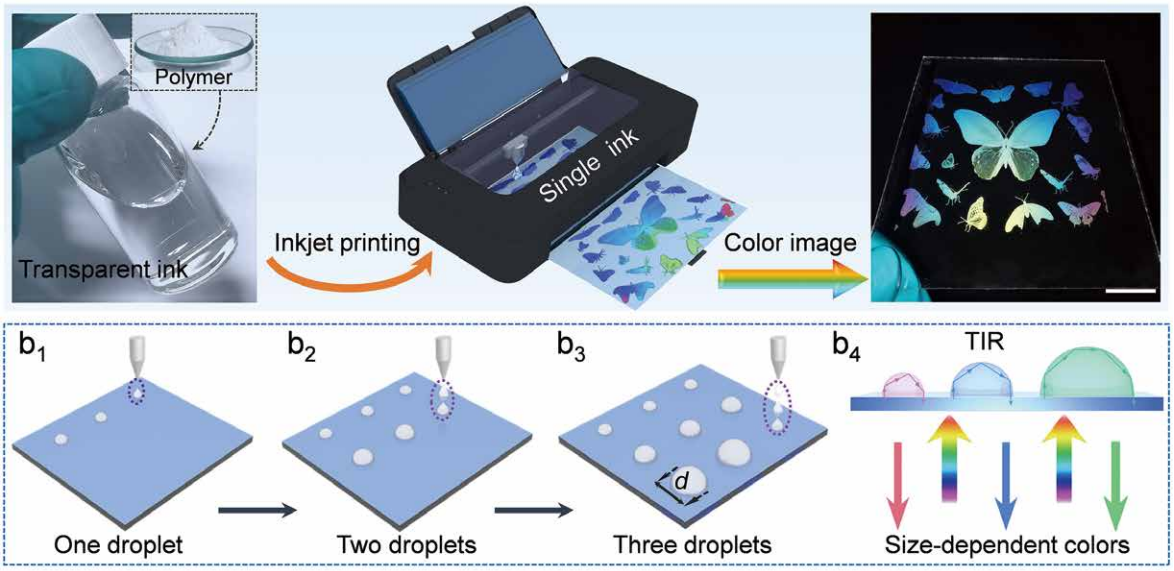

Reference

Kaixuan Li, Tongyu Li, Tailong Zhang, Huizeng Li, An Li, Zheng Li, . . . Yanlin Song, (2021) Facile full-color printing with a single transparent ink. *Science Advances* 7, eabh1992. doi: doi:10.1126/sciadv.abh1992.