

A microscopic view of a microchip, showing a central square chip with a grid of gold pins, surrounded by various metal components and wiring.

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Inkjet Printed Patterned Bank Structure with Improved Color Conversion for Modern Display

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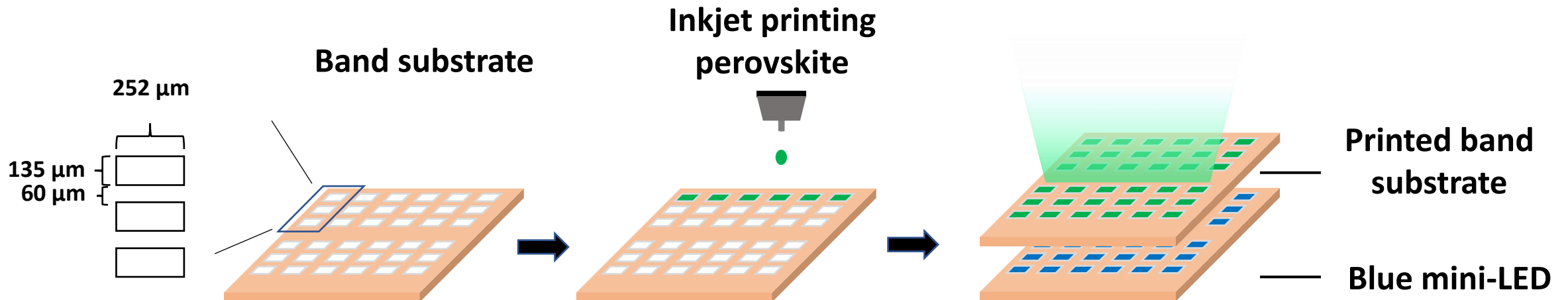
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Abstract

- Green emissive CsPbBr_3 and red emissive $\text{CsPb}(\text{Br}/\text{I})_3$ perovskite nanocrystals with high absorption cross-sections were synthesized
- By optimizing the ink solvents, coffee ring can be avoided during inkjet printing
- Green and red perovskite band structure thin films were fabricated by inkjet printing and applied onto a blue mini-LED to achieve display application

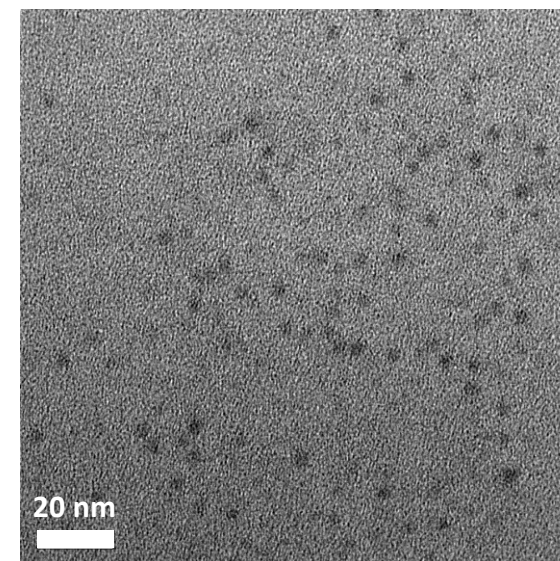
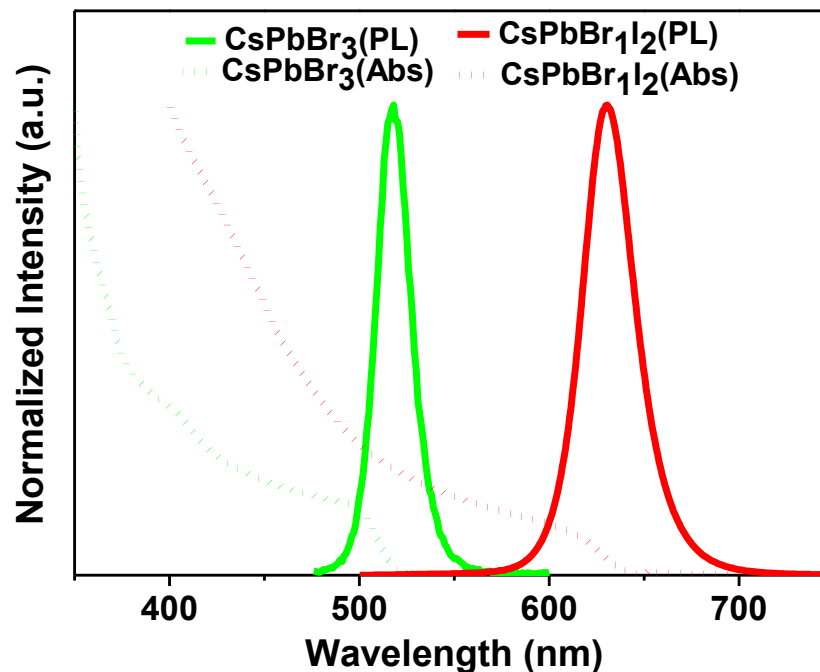


Results

Properties of perovskite nanocrystals



Photographs of green and red perovskite under 365 nm UV



TEM image of CsPbBr₃ nanocrystals

	Green perovskite CsPbBr ₃	Red perovskite CsPbBr ₁ I ₂
Solution QY (ex 365 nm)	92 %	77 %
Thin film QY (ex 450 nm)	48 %	21 %
Photoluminescence	518 nm	630 nm
FWHM	20 nm	32 nm

Results

Ink optimization

Octane/Dodecane	Surface Tension	Density	Viscosity	Z
4:6	23.73	0.731	0.95	20.1

$$Z = \sqrt{\sigma \rho d} / \gamma$$
 (Surface tension: σ , N m⁻¹; Density: ρ , g cm⁻³ ; Viscosity: γ , mPa s; Nozzle diameter: d , μ m)

Inkjet printing of green and red perovskite nanocrystals

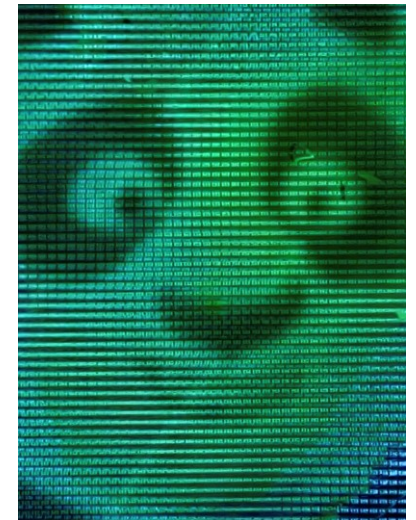
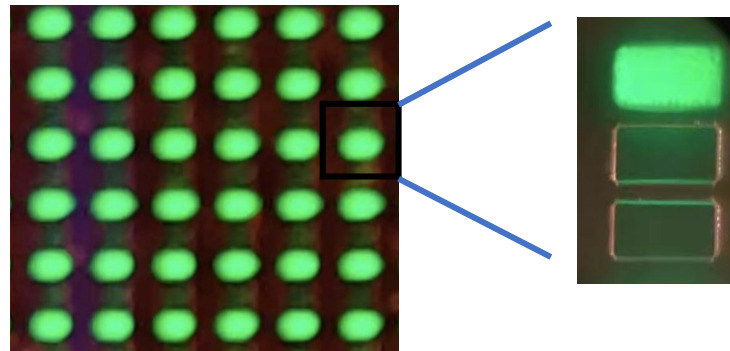
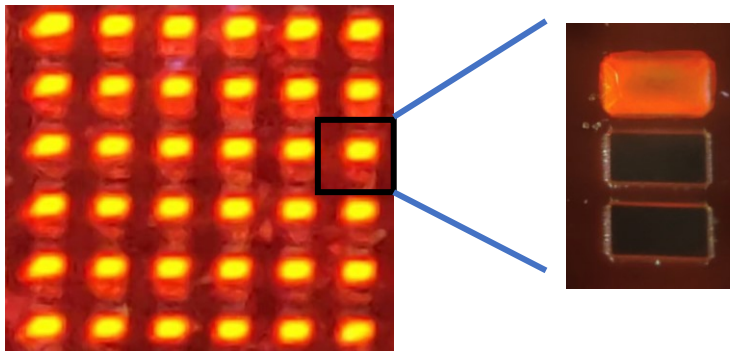


Image brightness: 66 nits

Conclusions

- Green and red emissive perovskite nanocrystals with high quantum yield and narrow bandwidth were synthesized
- The coffee ring effect was avoided by ink optimization
- Patterned CsPbBr₃ and CsPb(Br/I)₃ perovskite nanocrystals thin films using inkjet printing were fabricated

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