

Supplementary Materials

Automated production of batched unclonable micro-patterns anti-counterfeiting labels with strong robustness and rapid recognition speed

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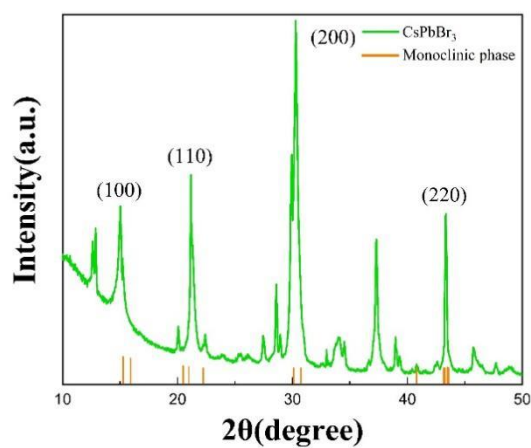


Figure 1. the X-ray diffraction (XRD) characterization data of CsPbBr₃ quantum dot film.

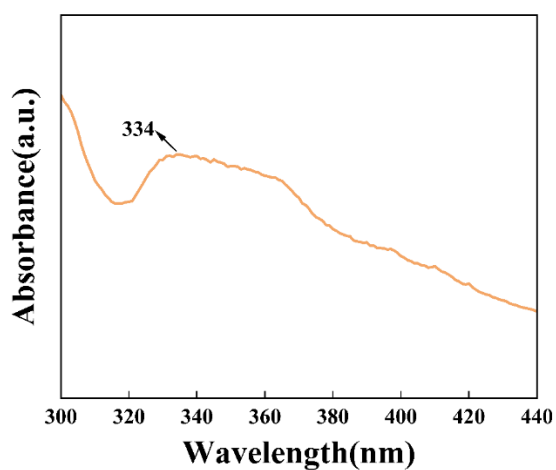


Figure 2. Absorption spectrum of CsPbBr₃ quantum dot film.

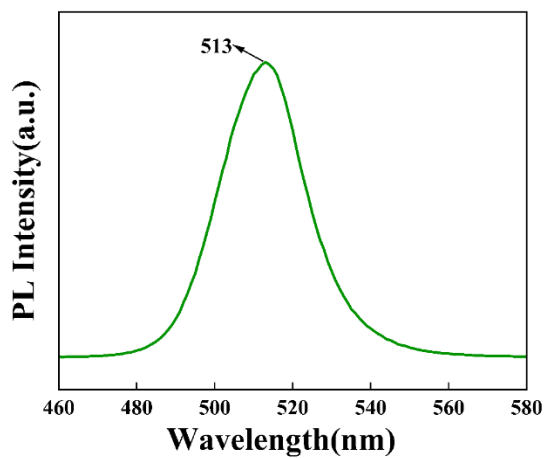


Figure 3. photoluminescence spectrum of CsPbBr₃ quantum dot film.

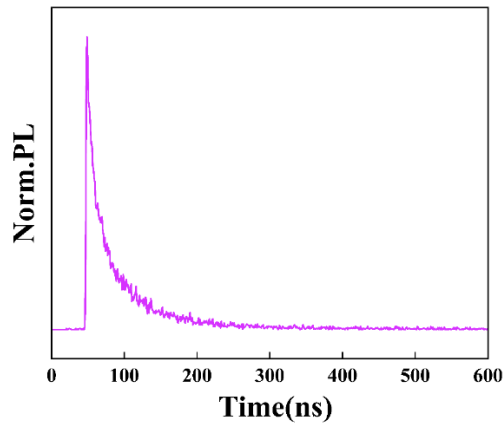


Figure 4. Fluorescence decay spectrum of CsPbBr₃ quantum dot film.

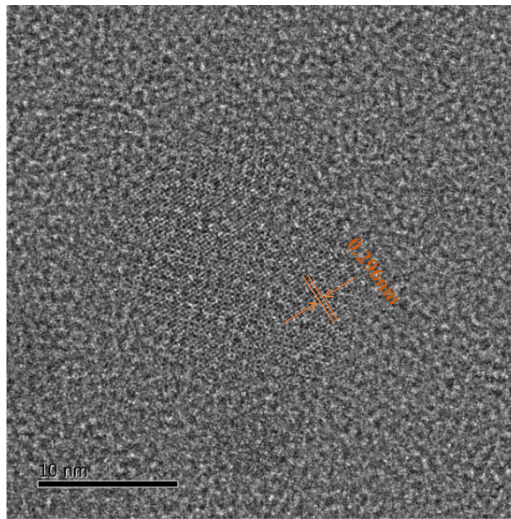


Figure 5. The high-resolution transmission electron microscopy image of CsPbBr₃ quantum dots.

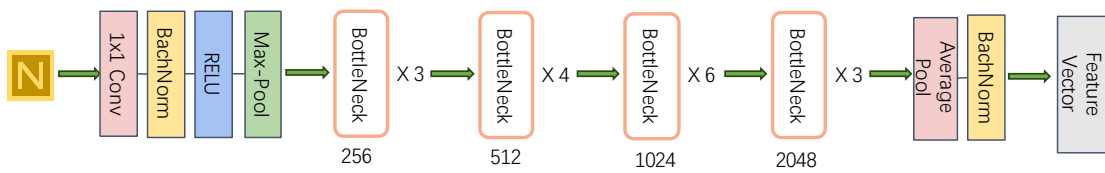


Figure 6. The network architecture of ResNet-50

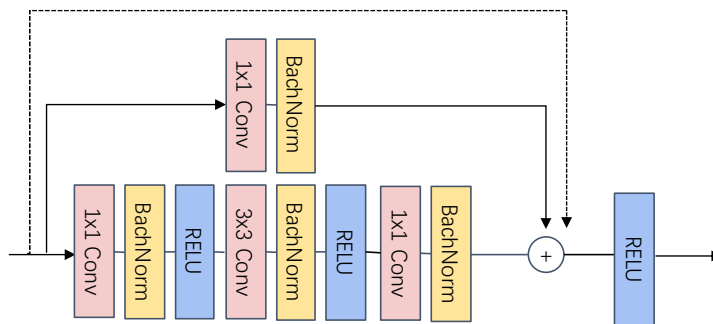


Figure 7. The specific structure of the Bottleneck.













































Category	Drawing	Digit	Letter						Chinese character		
Specific examples		 	     	  							
		 	     	  							
		 	     	 							
			     	 							

Figure 8. Examples of micro-patterns of perovskite quantum dot film (under a fluorescent microscope).

Note 1: Price calculation of precursor solution

The costs of 0.0852 g of CsBr and 0.1468g of PbBr₂ are 0.2692 and 1.2639 USD, and the cost of 10 mL dimethylformamide is 0.1532 USD. The cost of 1ml oleic acid is 0.01614 USD and the cost of 0.5ml oleylamine is 0.03897 USD. Therefore, the cost of 1 mL of Precursor solution is about 0.1514 USD.

The cost of 10 ml toluene and 22 ml ethyl acetate are 0.5026 USD and 0.4664 USD, and the cost of 2ml n-hexane is 0.1255 USD. Then, the cost of 1 mL of perovskite quantum dot solution is about 0.6230 USD.

In conclusion, the reagent price we consume for processing a substrate containing about 4800 safety labels is 0.6230 USD, i.e., 0.0001297917 USD per label.