Supplementary Information

Succinic acid assisted stability enhancement of colloidal organometal halide perovskite and its application as a fluorescent keypad lock

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1. Material characterization

1.1 UV Vis Absorption Spectroscopy and Photoluminescence Spectroscopy Shimadzu UV-Vis 2450 spectrophotometer was used for recording UV-Vis absorption spectra in the range of 200-650 nm. Photoluminescence spectra were taken by Horiba scientific Fluoromax-4C spectrophotometer. A quartz cuvette of 10 mm path length and volume 3 ml was used for collecting the spectra.

1.2. TCSPC studies Fluorescence lifetime decay measurements were recorded on 1cm quartz cell on a Horiba Jobin Yvon ," Fluorocube Fluorescence Lifetime System" equipped with NanoLEDs and LDs as the excitation source and an automated polarization accessory (Model 5000 U-02).

1.3 Fourier Transform Infrared Spectroscopy (FTIR) Infra red spectra (IR) of material were recorded by using Thermo scientific Nicolet 6700. The use of the spectral subtraction provided reliable and reproducible results.

1.4 X-Ray Photoelectron Spectroscopy (XPS) Thin film of perovskites has been studied on XPS with model no. PHI 5000 VersaProbe III for surface analysis.

1.5 Transmission Electron Microscopy (TEM) TEM study was carried out by TEM TECHNAI G2 20 S-TWIN. A drop (5-10µL) of diluted samples was placed on Carbon coated Copper grid. Again a drop was added before drying it. Afterwards drying was carried at ambient temperature.

1.6 Powder XRD was carried out on Bruker -D8 Advance having Target Cu and accelerating voltage 40kV from 5 to 50° at the rate of 2°/min. Thin film samples were prepared on silica glass.

1.7 FE-SEM (Carl Zeiss) has been formed to know about the surface morphology of thin film of perovskite on glass slide at 20 kV.
Figure S1. FT-IR spectra of MAPbBr$_3$ solution
Table S1 summarizes solved Powder XRD pattern for MAPbBr$_3$ Perovskite solution

<table>
<thead>
<tr>
<th>2$\Theta$</th>
<th>$\Theta$</th>
<th>sin$\Theta$</th>
<th>2sin$\Theta$</th>
<th>Sin$^2\Theta$</th>
<th>Ratio</th>
<th>d</th>
<th>(hkl)</th>
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<td>0.780</td>
<td>0.152</td>
<td>9</td>
<td>1.97</td>
<td>(300)</td>
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</table>
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