Electronic Supplementary Material (ESI) for Materials Advances.


# Supplementary data

## Enhanced photosensitive properties of single-crystal formamidinium lead bromide iodine ($FAPbBr_2I$) based photodetector

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**S1. Photoconductivity measurements using two probes:**

The study of an incident photon's conversion into an electrical signal comes under photocurrent analysis. Time-dependent photocurrent measurements are performed under the monochromatic laser for UV, visible, and NIR wavelength[1].These measurements are used to calculate the responsivity and Detectivity of the curve as different voltages are applied as direct function. Two probes optoelectrical analysis of the single crystal has been done by using the cascade Keithley 2634B source meter with Microtech instrument accompanied along with the illumination sources of UV-376nm (Pd=2.87mW/cm$^2$), Visible impact-532 nm (Pd=32mW/cm$^2$), and NIR impact-1064 nm (Pd=18 mW/cm$^2$) as depicted in Figure 1. The photoresponsivity and Detectivity are estimated using the relation, the number of photocurrents generated by photons per unit illumination area, and the light sources' incident power[2,3].

$$R_{ph} = \frac{I_{ph}}{P_d A}$$

where $R_{ph}$ represents photoresponsivity, $A$ represents an illumination area, $P_d$ represents an incident power. Detectivity defines a relation to the noise-equivalent power (NEP) and responsivity[4]:

$$D = \frac{R_{ph}\sqrt{A}}{\sqrt{2qI_{dark}}} =$$

Where $I_{dark}$ representsa dark current, $R_{ph}$ photoresponsivity, $q$ is the elementary charge, and $A$ means illumination area.

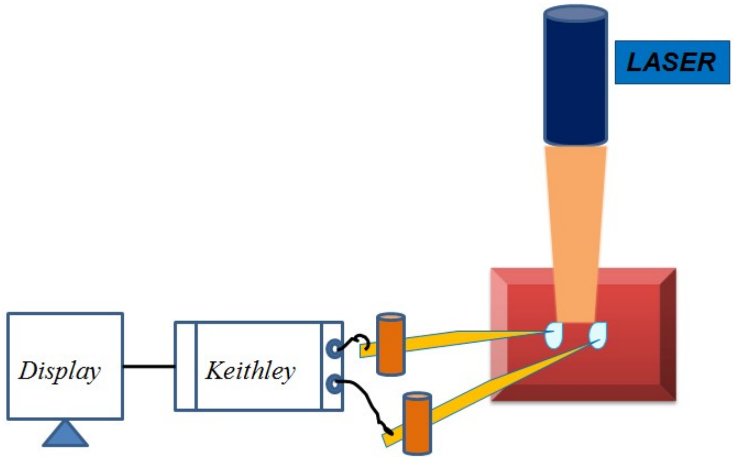


***Figure S1: Illustration of two probes photoconductive measurement setup.***

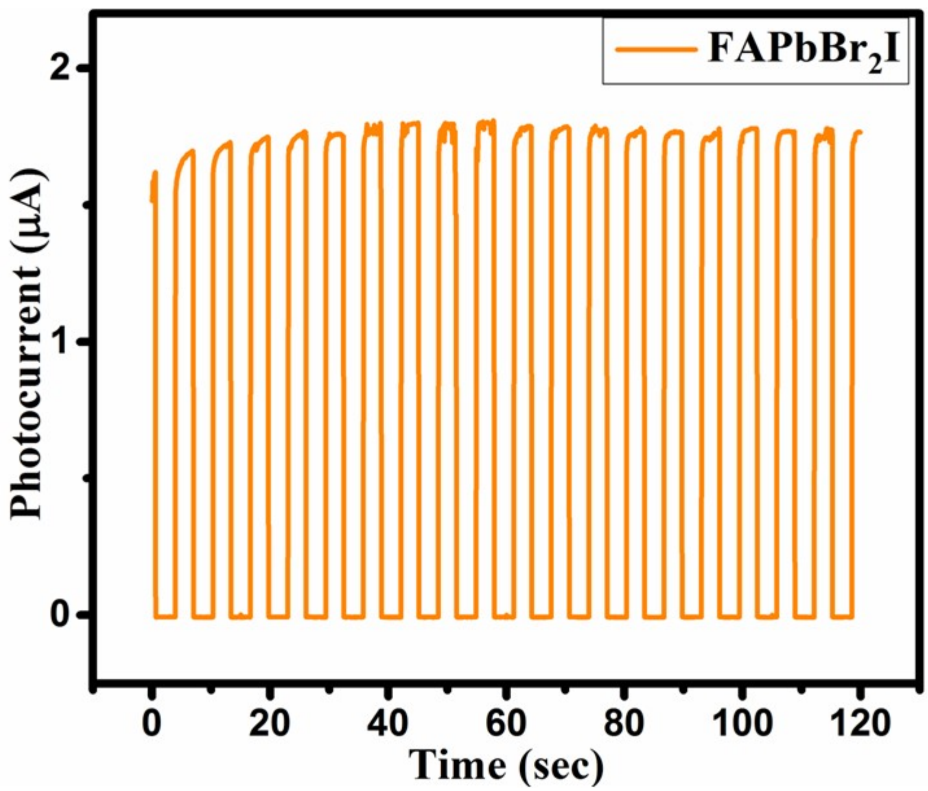


***Figure S2: Represent Extended photocurrent response.***

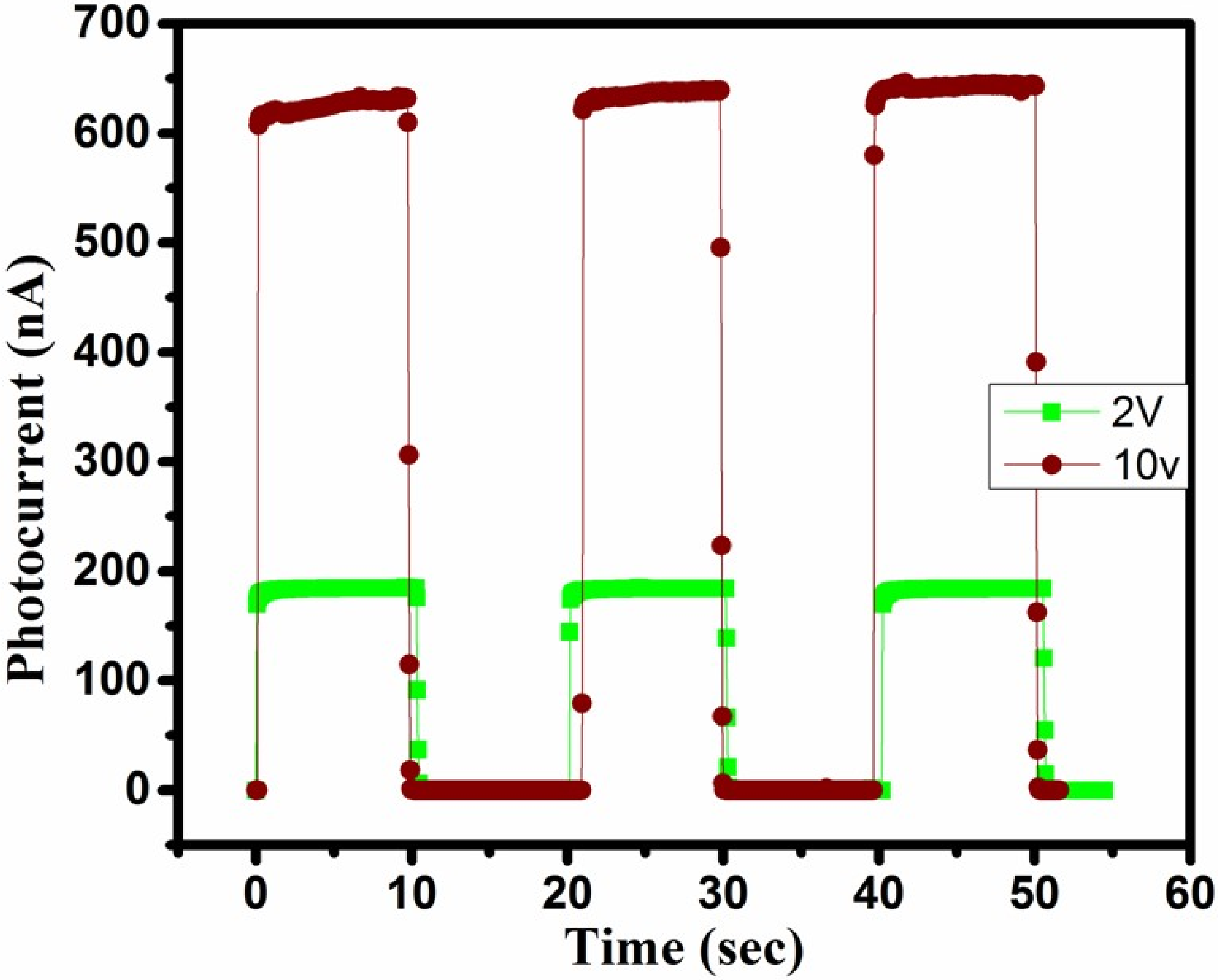


*Figure S3: White light photocurrent response.*

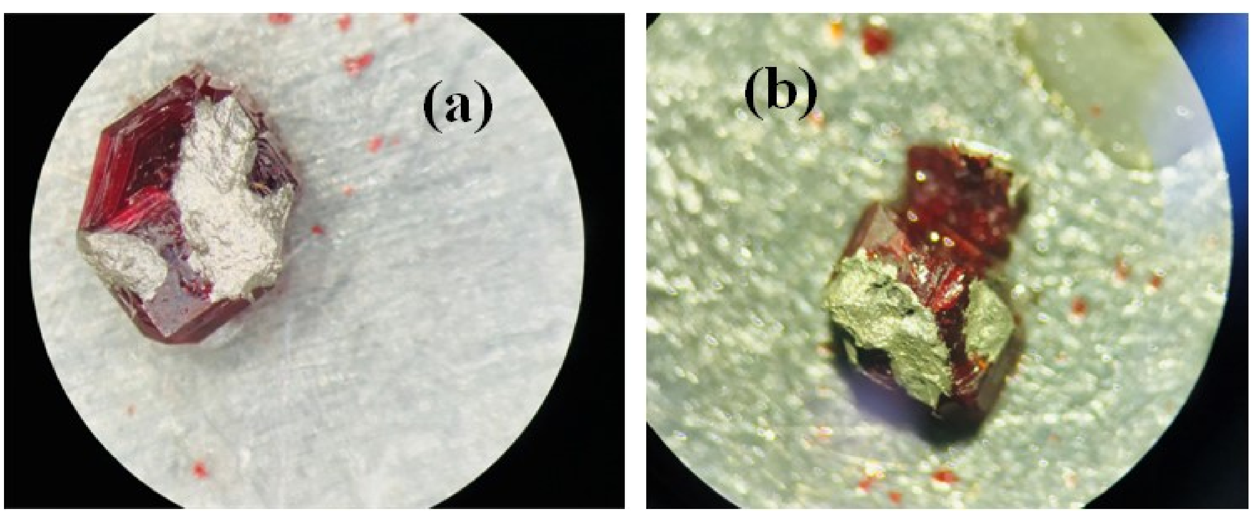

***Figure S4: (a) Initial $FAPbBr_2I$ single crystal and (b) after 8 months of the period show there is no colour change in $FAPbBr_2I$ perovskite single crystal.***

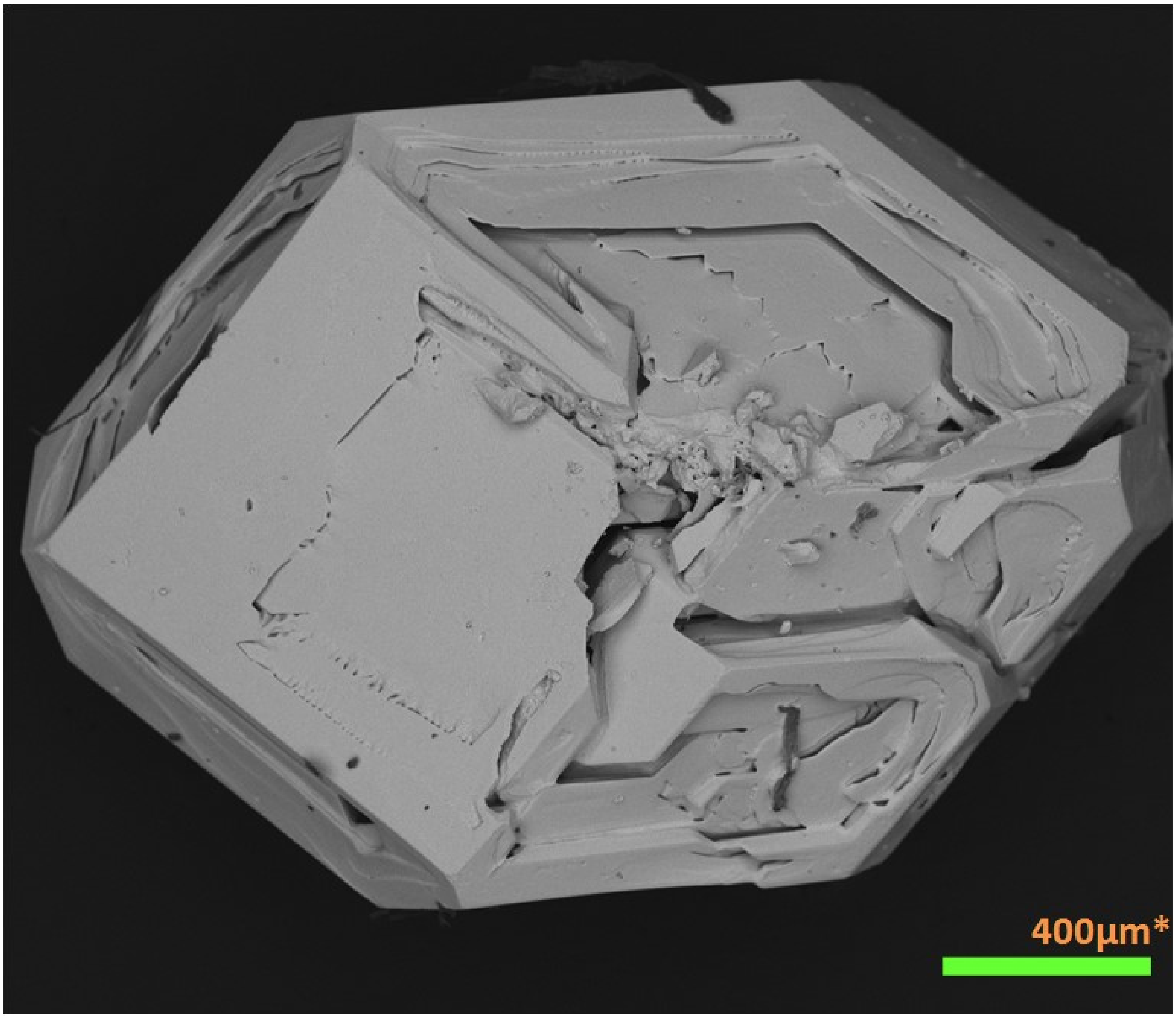


***Figure S5: SEM image $FAPbBr_2I$ perovskite single crystal.***

**References:**


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