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Supporting Information

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Record Stability for Fully Passive Perovskite-Based X-Ray Detectors Through the Use of Starch as Templating Agent

Matteo Verdi, Antonella Giuri, Andrea Ciavatti, Aurora Rizzo, Carola Esposito Corcione, Laura Basiricò, Silvia Colella and Beatrice Fraboni**

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Perovskite-Starch composite	Perovskite formulation	Starch concentration (%wt)	Active layer Thickness (nm)	Rectification Factor
MAPI-10S	$MAPbI_3$	10	470	917
MAPI-15S	$MAPbI_3$	15	1050	235
MAPI-20S	$MAPbI_3$	20	1400	411
FAMA-10S	$FA_{0.6}MA_{0.4}PbI_3$	10	470	1145
FAMA-15S	$FA_{0.6}MA_{0.4}PbI_3$	15	1050	760
FAMA-20S	$FA_{0.6}MA_{0.4}PbI_3$	20	1400	127

Table S1. **Perovskite-starch nanocomposite.** Different perovskite formulations starch concentrations and the respective active layer thickness.

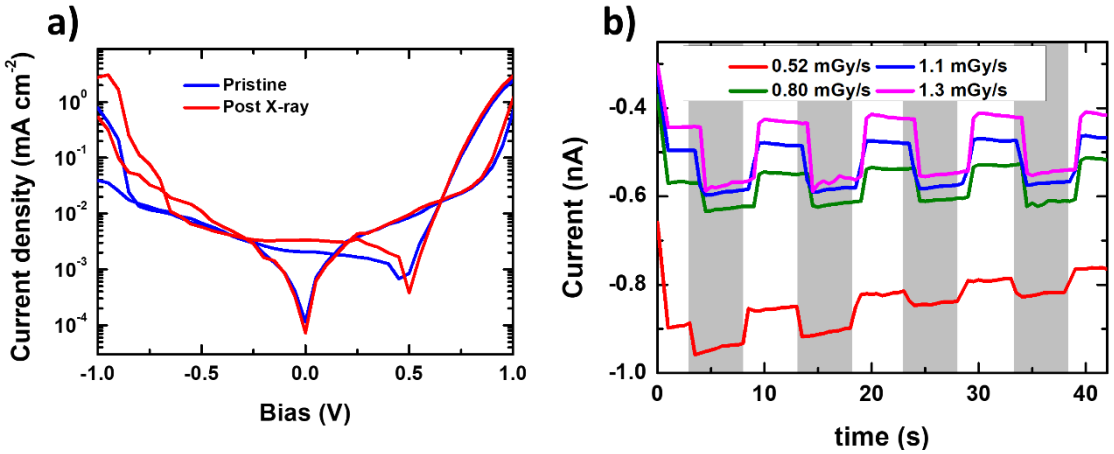

Figure S2. MAPI reference. J-V characteristic (a) and 40kVp X-ray dynamic response of bare MAPI reference device.

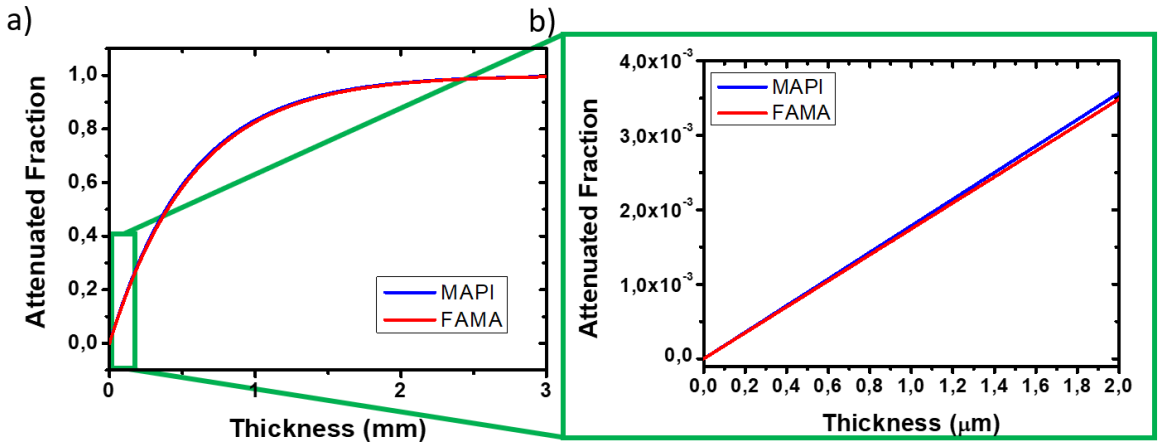

Figure S3. Attenuated Fraction. A) Comparison between the attenuated fraction of MAPI (blue line) and FAMA (red line), calculated considering an X-ray beam with energy 9keV. B) Attenuated fraction in the thin film thickness range used for this work.

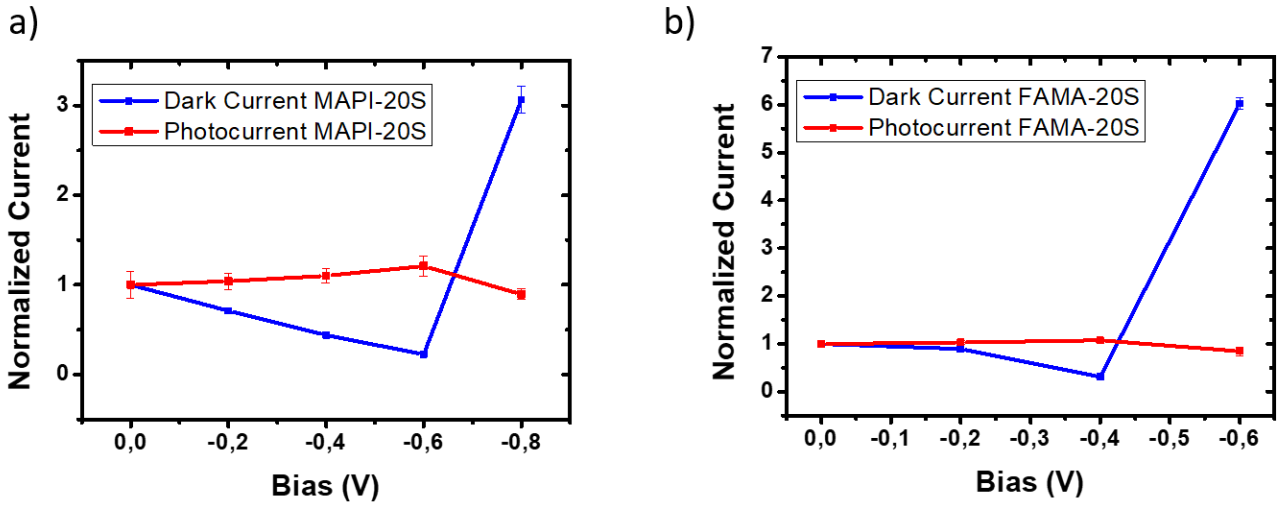

Figure S4. Dark current. Variation of the normalized dark and photocurrent with the increase of reverse bias for MAPI-20S (a) and FAMA-20S (b).

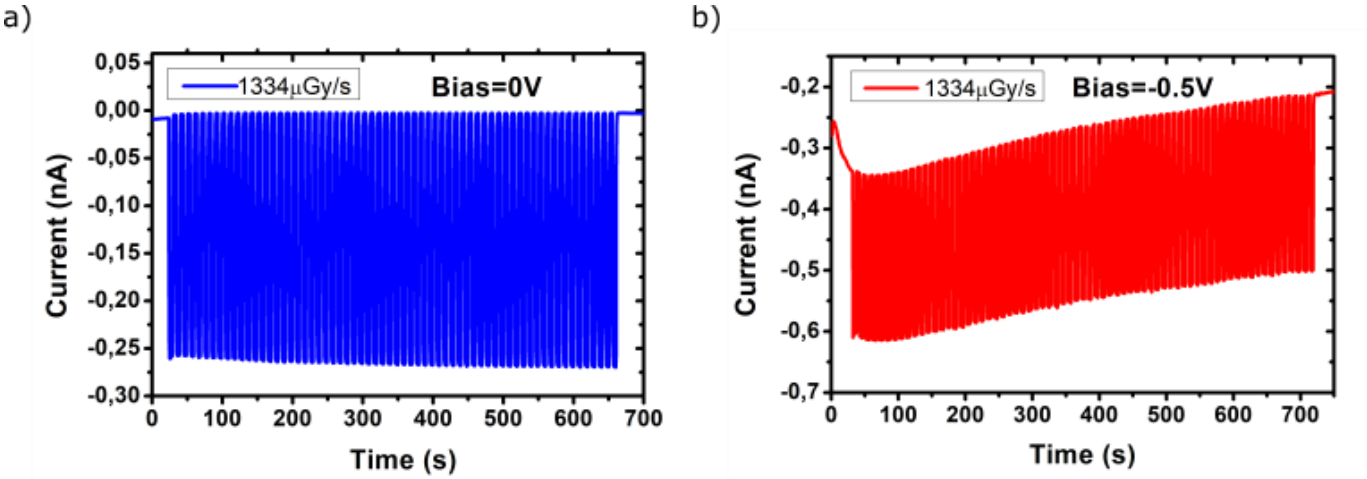

Figure S5. Bias Stability. Operational stability under 40kVp X-rays with on/off cycle period of 10s. a) Acquired in passive mode (0V) and b) acquired with -0.5V of bias applied

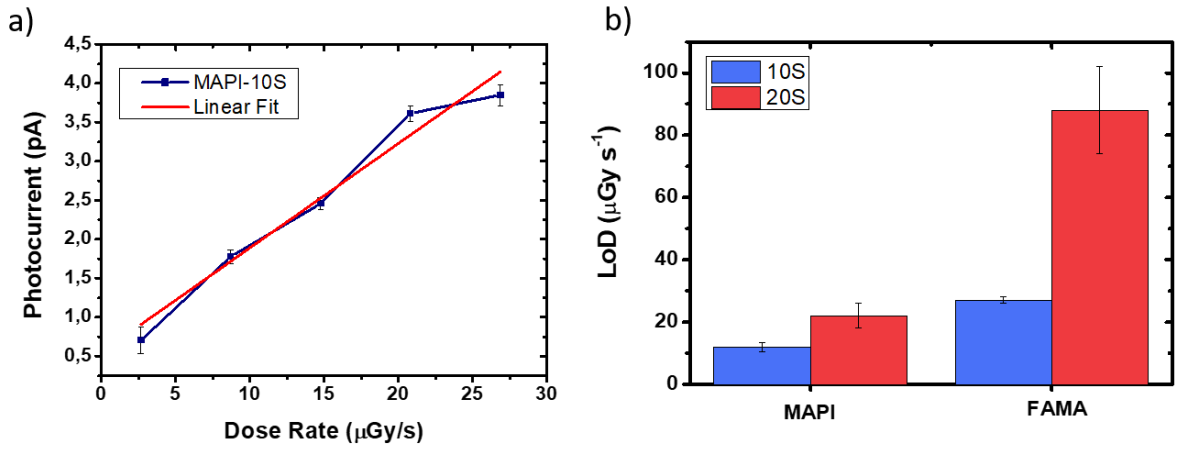

Figure S6. LoD. a) Extrapolation of the best LoD value. b) Summary of the LoD values for the different perovskite-starch nanocomposite-based devices.

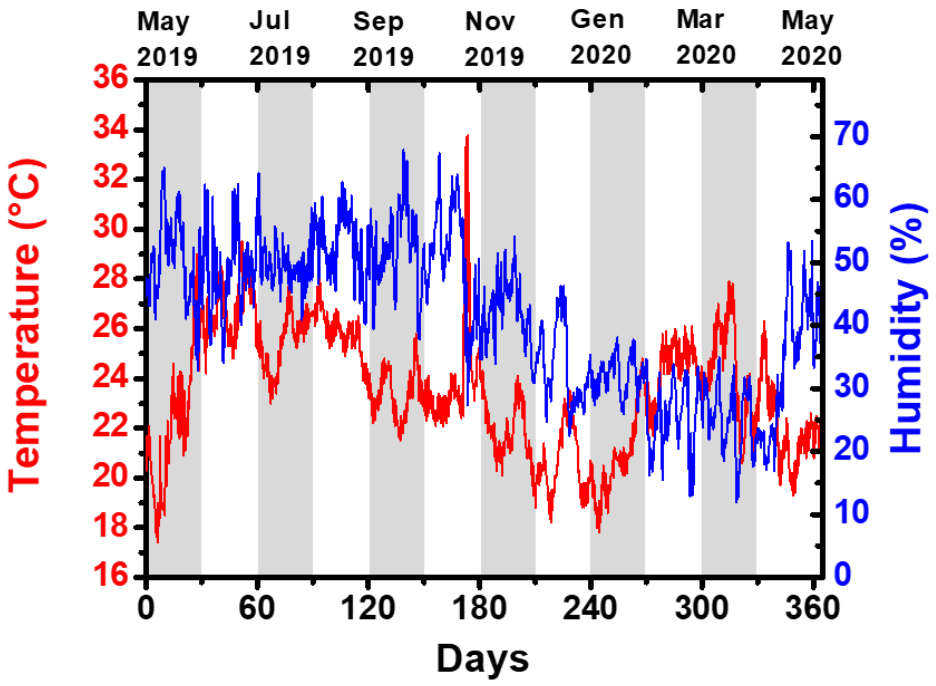

Figure S7. Temperature and Humidity. The graph shows temperature and relative humidity values for 1 year measured where the sample were stored.

The average temperature recorded form May 2019 to May 2020 was of 23.8°C and the average relative humidity was of 38.8%. However, the maximum temperature and humidity values at which the samples were expose after the fabrication were 33.8°C and 69.9% respectively

Sample	Time (Days)	FF	Voc (V)	Jsc (mA cm^{-2})	PCE (%)
MAPI-10S	0	78.4	1.09	19.7	16.9
MAPI-10S	629	33.7	1.02	9.3	3.2
MAPI-20S	0	60.2	1.13	15.9	10.9
MAPI-20S	629	45.8	1.078	6.6	3.2

Table S8. Performance under light. Table reporting the performance under 1sun illumination for MAPI X-ray detector in pristine condition and after 629 days of storage.