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CsPbBr3 Nanowire Scintillator for High-resolution X-ray tomography

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Metal halide perovskite (MHP) nanomaterials show large potential as scintillators for X-ray imaging. They have a high light yield and micrometer spatial resolution. Compared to 2d imaging, tomography requires excellent stability of the scintillator, since many projections with identical flat field images are necessary to reconstruct artefact-free 3d volumes. To provide this stability is challenging for MHPs, which often suffer from fast degradation under X-ray irradiation and ambient conditions.
Here, we show that CsPbBr3 nanowires grown in an anodized aluminum oxide membrane (CsPbBr3 NW/AAO) [1] have sufficient stability to acquire an X-ray micro tomogram with a commercial Cu lab source. During the measurement the scintillator brightness changed less than 5% of its peak value, which enabled a successful 3d reconstruction. Furthermore, over 2 weeks of continuous X-ray exposure the scintillator showed less than 14% brightness fluctuations and a stable resolution of (180 ± 20) lp/mm, despite changes in the ambient humidity from 7.4 %RH to 34.2 %RH.
This demonstrates that our CsPbBr3 NW/AAO scintillators are a promising material for new high resolution X-ray imaging detectors.

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