Internship Agfa Healthcare project proposal:

# X-Ray photoconductor screening

The aim of this project is to evaluate several possible candidates with potentially interesting photo-conducting properties for their use in direct conversion X-ray detectors. Direct conversion X-ray detectors produce images of higher quality than the indirect conversion X-ray detectors currently used in general radiography. Indirect conversion involves the use of a scintillator to convert incident X-rays into visible light, which is then converted into a current by a photodiode. On the other hand, direct conversion X-ray detectors use photoconductors which produce a current directly from the incident X-ray photons.

The only direct conversion X-ray detectors which have been commercialized so far use amorphous selenium as the photoconductor material and are only used for mammography, in which low-energy X-rays are used. However, these selenium-based direct conversion X-ray detectors are unsuitable for general radiography due to the very high costs of production and due to the photoconductor's low attenuation of high-energy X-rays. Hence, new photoconductor materials with lower costs of production and higher attenuation of high energy X-rays are required to expand the use of direct conversion X-ray detectors into general radiography thereby improving the resolution and efficiency of the imaging. Therefore, the preferred candidates are photoconductors that can be produced via a low cost coating as pigment in binder on a flexible substrate, which fits Agfa's expertise and infrastructure. This work is part of a broader funded European project and will focus mainly on the synthesis and screening of potential candidate photoconductors.

In the past year, the cesium lead bromide perovskite has been identified as a potential candidate. Optimization of the synthesis of microcrystal $CsPbBr_3$ powder, optimization of the coating conditions and investigation of the effect of electron- and hole transport layers on the efficiency will be the main experimental task in the project. The search for other candidate as efficient X-ray photoconductor and the synthesis of these compounds will be further addressed.

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