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## **K-edge sensitive X-Ray Radiography for Small Animal using fully spectral Timepix3 detector**

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Tissue type sensitive imaging with photon counting detector of Medipix family has been demonstrated recently. This capability stands promising for diagnosis of different diseases and pathological changes. In comparison methods with contrast agents provide functional information. Usage of contrast agents brings however complexity and drawbacks such toxicity. Most contrast agents used in clinical practice are iodine-based compounds. Iodine contrast agent in high concentration that is required for high contrast can lead to fatal effects. The main goal of researchers is to develop a new type of contrast agents with low toxicity or decrease the volume of the contrast agent injected to specimen. To achieve this the new more sensitive imaging methods are needed. One of these methods is K-edge imaging. K-edge imaging is a unique method that provides detection and quantification of given element thanks to element specific increase in x-ray absorption occurring at a specific energy. For this purpose, a high resolution energy and high spectral sensitive imaging detector such as Timepix3 is needed. Spectral measurements were performed using new developed Timepix3 and Medipix3 detectors. Spectral performance and properties of 300  $\mu\text{m}$  thick silicon and 1000  $\mu\text{m}$  CdTe were evaluated. Commonly used contrast agents such as iodine resp. gold based compounds with K-edges at 28.1 keV (K $\alpha$ ) resp. 68.8 keV (K $\alpha$ ) were used as suitable candidates.

Thanks to revealing of contrast agents based on their spectral responses gain K-edge imaging method a high potential for preclinical diagnostic.

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