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Development and application of scintillating Glass-GEM detector

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A novel radiation imaging gaseous detector has been successfully developed and 3D computed tomography (CT) is successfully demonstrated. The imaging system consists of a chamber filled with Ar/CF₄ scintillating gas mixture, inside of which Glass GEM (G-GEM) is mounted for gas multiplication. In this system electrons are generated by the reaction between X-rays and the gas, and visible photons by excited Ar/CF₄ gas molecules during the gas electron multiplication process in the G-GEM holes. These photons are detected by a mirror-lens-CCD-camera system and a radiograph is formed. Here, we report on the scintillation properties of G-GEM and the results of using it as a digital X-ray imager with a large sensitive area. Since the imaging system is based on a gaseous detector, it shows high sensitivity to low-energy X-rays, which results in a high contrast radiograph for elements with low atomic numbers. In addition, the combination of G-GEM (280 μm pitch precise holes) and a 300,000 pixel CCD sensor enables high spatial resolution. Moreover, a high gas gain of G-GEM enables rapid imaging. Successful operation of G-GEM with a scintillating gas and a mirror-lens-CCD-camera system has enabled us to realize a novel radiation imaging device for digital X-ray imaging and we successfully demonstrated 3D X-ray CT.

In the presentation, we would introduce the development of the detector. In addition we will focus on new applications such as soft X-ray imaging, medical applications and 3D CT.

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