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Evaluation of capillary plate gas detector filled with Ne+CF₄ and Ar+CF₄ gas mixture

We report on the basic characteristics of a capillary plate (CP) gas detector filled with CF₄ gas mixtures of Ne/Ar as a gas scintillation proportional counter. Both the charge and light signal were investigated. Gas gains of up to 10^4 can be achieved with the gas mixtures. The energy resolutions of the charge and light signals were 19.6% and 23.5% for 5.9 keV X-rays, respectively, at a gas gain of 5000 in Ne (90%) + CF₄ (10%) gas mixture. The emission spectra of the gas scintillation light were measured using the grating spectrophotometer in the range from 300 nm to 800 nm. There was one broad continuum extending from 450 nm to 680 nm with the peak of 620 nm for both gas mixtures. The spectra also show the presence of the atomic lines of Ar and Ne. We exploited the scintillation light for the realization of the pixelized 2D imaging gas detector. Sharp images of X-rays and a spatial resolution of less than 160 μm were obtained using an optical imaging system consisting of a standard photographic lens and a CCD camera.

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