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Study on Ferroelectric Thin Film Capacitor for AC-coupled CdTe X-ray Detector

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We present that fabricating ferroelectric thin film capacitor on electrodes of the X-ray detector to make AC-coupled CdTe X-ray imager. In order to determine the capacitance required for the coupling capacitor, radiation spectrum is measured by using some coupling capacitor have different capacitance. As a result, it was found that the more the capacitance is large, we can get correct radiation spectrum. Because small capacitor with large capacitance is required, BaTiO₃ is selected as a high dielectric constant material. We fabricated a ferroelectric thin film capacitor with an area of about 48 μm² and a thickness of about 100nm by sputtering. As a result of measurement, the capacitance is about 880 pF, and the tendency of variation of dielectric constant with frequency corresponded with past paper. Although the dielectric constant was significantly smaller than the BaTiO₃ film in the papers. We considered that the main issue is quality of BaTiO₃ film. Quality of film is increased by depositing under high substrate temperature. Performance of CdTe as a radiation detector is deteriorated by high temperature. Therefore, we need to consider the way to deposit BaTiO₃ on CdTe at low substrate temperature.