

Development of the artificial diamond particle detector

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As it is represented to the space station and space weather forecast in recent years, the research of the plasma and particles in the outer space that surround earth periphery are important. Also, the various planet investigation in the solar system is planned even domestically. The high energy particle that was generated along with the sun activity causes various physics phenomena in the planet magnetosphere. We have understood that high energy particles (several of 100keV - several MeV) are generated comparatively along with these physics phenomena, by the satellite observation in recent years. However, with what kind of mechanism it is generating a high energy particle along with the physics phenomenon of the short magnetosphere of the time scale, comparatively and also timing etc. that high energy particle appears there are few observation cases. The observation that measured the kind and energy of the particle that are the key of the generation system especially. The observation data of the high accuracy is necessary continuously, to catch radiation and high energy phenomenon. However, at present that radiation damage is large in the Si detection device and it is an obstacle that the energy measurement of less than several 10keV is impossible due to noises in temperature environment over 30 degrees. Thereupon, I want to do the development of the detection device that even a high temperature and high radiation environment under stabilizes and observation be able to do in a long term.

Because the artificial diamond crystal that stabilized in the last several years became possible and obtained has the wide band gap 5.5eV under high temperature environment action that stabilized in comparison with Si (1.2eV band gap) is expected. The group of Russia that used a natural diamond is acquiring the data of the alpha rays of 5.4MeV with 300 degrees. Naturally, as for the few artificial diamond of a crystal defect the performance over the natural diamond is expected. Also, it is able to expect, that a diamond crystal is very strong to radiation damage because of their high binding energy. Thereupon, we are under development of stable action possible, high-energy particles detection device for long time under, a high temperature and high radiation environment where used an artificial diamond detection device. We report results of experience for diamond semi conductive detectors in recently and their applications.