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Development of desktop Dielectric Ion Accelerator for radiobiological experiment

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Desktop size Dielectric Ion Accelerator (DIA) is being developed at The University of Tokyo and KEK in Japan. X-ray, proton beam, and carbon beam have been widely used in radiation therapy for cancer treatment in order to study the factors that decide the radiation therapy sensitivity. It is important to analyze the cellular response to these radiations. However, the biological irradiation studies for the heavy particle radiotherapy can be carried out in limited facilities. For that reason, we focused on developing a compact accelerator for the spread of the radiation therapy. Therefore we plan to develop a 500[keV]-1[MeV] acceleration system only several dozen centimeters in length which dedicated to the cell irradiation. This DIA consists of stacked Blumlein circuits which made from Si wafer with microstrip line. Blumlein circuit switched by photoconductive switch can be a multistage structure and can generate intense electric field in the interior of the acceleration tube. Current status of our research is that we are examining material property of the device composed of an integrated combination of Blumlein circuit with microstrip line, the photoconductive switch and the acceleration tube. At the meeting we report on this progress.

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