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# Study of molecular structure change of D- and L-glucose by proton irradiation using terahertz spectroscopy

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We investigated molecular structure change of D- and L- glucose by proton beam irradiation of 7.8 MeV, using terahertz time-domain spectroscopy. Both glucose pellets exposed to the irradiation of $10^{13}$, $4\times10^{13}$, $6\times10^{13}$, and $8\times10^{13}$ particles/cm$^2$ of the particle's fluence, were characterized using complex refractive indices in terahertz frequency region. We found that fingerprints of two types of glucose in terahertz frequency were disappeared above $8\times10^{13}$ particles/cm$^2$. Crystallinity breaking and molecular structure change by proton irradiation was reaffirmed using X-ray diffraction (XRD) and Fourier transform infrared (FTIR) spectroscopy.

**Keywords**

terahertz spectrscopy; glucose; proton beam; infrared spectroscopy; X-ray diffraciton spectroscopy;