

## 放射光CTを用いた、隕石の総合観察システムの構築

### Development of integrated SR-CT method for the total analysis of meteorites

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Synchrotron radiation computed tomography (SR-CT) enables us to observe the internal structure of extraterrestrial materials with spatial resolution around 100nm three-dimensionally, without breaking them. In previous studies, however, we can not investigate the mineral phases and chemical composition of internal materials of the samples. In addition, considerable errors are occurred if we observed samples larger than the field of view of the CT instruments.

Recently, several methods of the combination of x-ray diffraction (XRD) and CT were developed in the material sciences of engineering fields [e.g. 1-2], and performed precise observation of polycrystalline metals or alloys. We can determine the mineral phases of the sample uniquely, orientation of the crystals inside them and analyze their chemical composition by linear attenuation coefficient [3].

In this paper, we report a new instrument for the total analysis of rocky material which includes XRD, SR-CT, and local tomography which images a region of interest of a sample by zooming up it. We also developed softwares for the integrated analysis of data obtained by the system. The software relates the images and data obtained by those different methods with simple operation. Using this system, we can search and investigate certain materials or minerals included in the sample, such as carbon phases. We also introduce future developments and application for analysis of materials obtained by future sample return missions.

References: [1] Toda et al., (2016) *Acta Materialia* 107 310-324. [2] West et al., (2009) *Scripta Materialia* 61 875-878. [3] Uesugi et al., (2013) *Geochimica et Cosmochimica Acta* 116, 17-32.

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