
[EJ] Eveningポスター発表 | セッション記号 P (宇宙惑星科学) | P-PS 惑星科学

[P-PS06] 太陽系物質進化

コンビーナ:山口 亮(国立極地研究所)、藤谷 渉(茨城大学 理学部)、癸生川 陽子(横浜国立大学 大学院工学研究院、共同)、鹿山 雅裕(東北大学大学院理学研究科地学専攻)

2018年5月23日(水) 17:15 ~ 18:30 ポスター会場 (幕張メッセ国際展示場 7ホール)

原始太陽系星雲における物質形成から原始惑星への集積、天体内部や表面での諸過程を隕石や他の惑星物質に対する研究と実験的研究の両面から議論する。初期太陽系の情報を保存する始原的物質(コンドライト隕石や惑星間塵、サンプルリターン試料)に関しては、それらの鉱物・有機物・水・希ガス・微量元素分析を通して明らかになった知見を総合理解することを目指す。分析手法開発研究(化学、理論、物性)や学生の萌芽的研究を歓迎し、将来の太陽系、惑星系形成研究の新たな開拓につなげたい。さらに分化隕石やコンドライト母天体における水質変成・熱変成作用、火成活動、コア・マントル・地殻形成、並びに天体衝突といった現象に加えて、母天体の内部構造や構成物質などについても議論する。実験的手法による惑星物質の組成、相平衡や構造に関する知見なども取り上げ、隕石とあわせて天体における諸過程を議論する。

[PPS06-P05] Primordial, thermal and shock features of ordinary chondrites: Bulk X-ray diffraction study using in-plane rotation of polished thin section

*今栄 直也¹、木村 眞¹、山口 亮¹、小島 秀康¹ (1.情報・システム研究機構 国立極地研究所)

キーワード: X線回折、普通コンドライト、かんらん石、輝石

Introduction

The X-ray diffraction data of stony meteorites includes information on the thermal and shock metamorphism modified from primordial features as well as the chemical group. The X-ray diffraction method is convenient, and rapidly clarifies bulk features of stony meteorites. In the present study, mainly Antarctic ordinary chondrites were examined using in-plane rotation method of polished thin section, and we established the criteria for the characterization.

Experiments

Sixty ordinary chondrites (23 H, 21 L, and 16 LL) were used for X-ray measurements (RIGAKU, SmartLab) on the condition of Cu K α ; with 40kV and 30mA through the slit of 10x10 mm in size. Peaks were mainly focused on olivine 130, clinopyroxene (Cpx) 22-1, orthopyroxene (Opx) 511 and kamacite 110.

Results and Discussion

Olivine 130 position is clearly correlated with the chemical group for equilibrated ordinary chondrites (EOCs), while the peak was splitted or broad for unequilibrated ordinary chondrites (UOCs) corresponding to olivines with different compositions in chondrules and matrices. The intensity ratios of kamacite was useful for distinguishing the chemical group between H and L-LL, but not definite, mainly due to terrestrial weathering of kamacite in H chondrites. The intensity of orthopyroxene (Opx) 511 is positively correlated with the metamorphic sequence from 3 to 6, and that of clinopyroxene (Cpx) 22-1 is inversely correlated. Shock stage is positively correlated with the full width of half maximum (FWHM) of Opx 511 and olivine 130 for each class. Part of Opx (Pbca) transformed finally to Cpx (P2₁/c) through Cpx (C2/c), where Cpx (C2/c) is stable under high pressure condition for shock stage S6 (Tenham and

NWA 4719). The shock melted LL chondrite is characterized by deficiency in Cpx but instead abundant homogeneous olivine. Both effects of thermal and shock metamorphism are thus included in the bulk X-ray diffractions.

Implications

The present method can apply for initial analyses of various extraterrestrial samples. We emphasize that it is newly developed approach for characterizing extraterrestrial materials without any significant damage during the measurements.