論文 / 著書情報
Article / Book Information

題目(和文)	炭素質コンドライトメタル相における強親鉄性元素及びOs同位体分析に基づく初期太陽系物質進化に関する研究
Title(English)	Analyses of highly siderophile elements and osmium isotope compositions in metal phases from carbonaceous chondrites for the study of the chemical evolution of the Solar System
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出典(和文)	学位:博士(理学), 学位授与機関:東京工業大学, 報告番号:甲第10728号, 授与年月日:2018年3月26日, 学位の種別:課程博士, 審査員:横山 哲也,中本 泰史,野村 英子,奥住 聡,太田 健二
Citation(English)	Degree:Doctor (Science), Conferring organization: Tokyo Institute of Technology, Report number:甲第10728号, Conferred date:2018/3/26, Degree Type:Course doctor, Examiner:,,,,
学位種別(和文)	博士論文
Category(English)	Doctoral Thesis
種別(和文)	論文要旨
Type(English)	Summary

（博士課程）
Doctoral Program

論 文 要 旨

THESIS SUMMARY

専攻： Department of	地球惑星科学　専攻	申請学位（専攻分野）： Academic Degree Requested	博士　（　理学　） Doctor of
学生氏名： Student's Name	中西　奈央	指導教員（主）： Academic Supervisor(main)	横山　哲也
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要旨（英文 800 語程度）
Thesis Summary（approx.800 English Words ）

Metal is one of the main components of chondritic meteorites that coexist with various meteorite components (i.e., CAI, chondrule, and matrix). The understanding of metal formation in chondrites provides important constraints on high temperature processes in the early solar system including direct condensation in the protoplanetary disk and chondrule formation. Highly siderophile elements (HSEs: Re, Os, Ir, Ru, Pt and Pd) have great affinity for metal phase relative to silicate phase. HSEs are refractory and exist as gas only at high temperatures. Therefore, geochemical investigation of HSEs in metal phases in a variety of meteorites can reveal the origin of metals. Specifically, the ^{187}Re–^{187}Os isotope system gives chronological information regarding the fractionation of HSEs.

This thesis consists of six chapters. Chapter 1 is general introduction in which the nature of chondritic metal grains is summarized together with the characteristics of highly siderophile elements and their analytical techniques. In Chapter 2, we have measured HSE abundances and Os isotope compositions in mm-size metal phases from CB_a chondrites to discuss the condensation conditions of the metal grains. We found that metals in CB_a chondrites formed by equilibrium condensation from a gaseous reservoir, of which the source could be the evaporated core of differentiated body through an impact event. In Chapter 3, we have re-evaluated and refined the chemical procedures of isotope analysis with TIMS for pg-level Os, aimed to examine in-situ Os isotope composition for individual chondritic metal grains with small in size (< 100 μm). By applying the method refined in this study, Os isotope compositions in metal phases from CR and CH/CB_b chondrites were obtained. In Chapter 4, we have measured the Os isotope compositions and HSE abundances in CR metals in order to constrain the formation of metal grains associated with chondrule formation. In CR chondrites, metal grains are found in three different locations; chondrule interior, chondrule surficial shells, and matrix. Our results showed that all three types of metals had been formed by fractional crystallization during chondrule formation event. In Chapter 5, we have discussed the thermal histories of metal grains in a unique carbonaceous chondrite, Isheyevo, the meteorite which has a transitional feature of CB_b and CH chondrites. Metal grains in Isheyevo were mainly dominated by “zoned metal”, “unzoned metal”, and “unzoned with Ni particles”. The zoned metals had Ni and Co rich cores, while the unzoned metals have homogeneous Fe, Ni, and Co abundances. In contrast, unzoned with Ni particles had small particles (< 10 μm) with high Ni abundances. We presented the first dataset of major elements, HSE abundances and Os isotope compositions in the metal grains from Isheyevo. From relative abundances of siderophile elements, three types of metals were found to have formed by condensation. However, different elemental distribution within single grains among three types of metals would reflect that they could have experienced different thermal histories. Chapter 6 is the synthesis of this thesis in which discussed the origin of compositional diversity in carbonaceous chondrites based on the understanding obtained in Chapters 2-5.

備考 ： 論文要旨は、和文 2000 字と英文 300 語を 1 部ずつ提出するか、もしくは英文 800 語を 1 部提出してください。
Note : Thesis Summary should be submitted in either a copy of 2000 Japanese Characters and 300 Words (English) or 1copy of 800 Words (English).