

論文 / 著書情報
Article / Book Information

題目(和文)	鋼の連続铸造モールドフラックス中の放射伝熱に及ぼす添加還元剤の影響
Title(English)	Effects of reducing agents on radiative heat transfer across mould flux for continuous casting of steel
著者(和文)	WangMin
Author(English)	Min Wang
出典(和文)	学位:博士(工学), 学位授与機関:東京工業大学, 報告番号:甲第9617号, 授与年月日:2014年9月25日, 学位の種別:課程博士, 審査員:小林 能直,須佐 匡裕,史 蹟,林 幸,上田 光敏
Citation(English)	Degree:, Conferring organization: Tokyo Institute of Technology, Report number:甲第9617号, Conferred date:2014/9/25, Degree Type:Course doctor, Examiner:,,,,
学位種別(和文)	博士論文
Category(English)	Doctoral Thesis
種別(和文)	要約
Type(English)	Outline

論文の要約

This thesis is entitled “Effects of reducing agents on radiative heat transfer across mould flux for continuous casting of steel”, and consists of six chapters: “General introduction”, “Iron oxide pick-up by iron oxide free mould fluxes”, “Reduction of iron oxides in mould fluxes with additions of reducing agents”, “Improvement of calculation model for radiative heat flux by net radiation method”, “Heat transfer characteristics of mould fluxes containing reducing agents”, and “Conclusions”. Mould fluxes usually contain and pick up iron oxide, which causes an increase in total radiative heat flux and does not benefit mild cooling of molten steel in continuous casting. The present study has investigated the formation mechanism of iron oxides in iron oxide free mould flux, examined the applicability of reducing agent additions to suppress iron oxide formation, improved the calculation model for radiative heat flux using net radiation method and evaluated heat transfer characteristics of mould fluxes containing reducing agents. Iron oxide forms at the mould flux/iron interface from molten iron and oxygen in the iron and diffuses into mould flux. Iron oxide has been reduced by reducing agents with an apparent reaction rate much larger than the value for iron oxide formation possibly due to a larger interfacial area. The calculation model has been improved to evaluate radiative heat flux across mould fluxes containing reducing agents by considering emissions from both the highest and lowest temperature sides and multiple reflections in solid mould flux and radiative energy returning from the mould. Additions of reducing agents have been examined to efficiently reduce the radiative and therefore total heat transfer across mould fluxes by decreasing transmissivity. 3-4 mass% CaSi_2 or Si additions have been proposed to optimise the composition of actual mould fluxes containing *ca* 2 mass% iron oxide and having the basicity of one for mild cooling of molten steel.