

## 論文審査の要旨

(Summary of Dissertation Evaluation)

博士の専攻分野の名称 (Degree)	博 士 (工学)	氏名 (Candidate Name)	KHUSNIDDIN ALIKULOV ZARIFOVICH
学位授与の要件	学位規則第4条第①・2項該当		
論 文 題 目 (Title of Dissertation) The Role of Hydrogen and Ammonia in Decarbonizing the Steel and Power Sectors (鋼鉄および電力部門の脱炭素化における水素とアンモニアの役割)			
論文審査担当者 (The Dissertation Committee) 主 査 教授 Tran Dang Xuan 審 査 委 員 教授 Masaru Ichihashi (Graduate School of Humanities and Social Sciences) 審 査 委 員 特任助教 La Hoang Anh 審 査 委 員 Seiki Soramoto (Member of the House of Representatives)			
〔論文審査の要旨〕 (Summary of the Dissertation Evaluation) The present study focuses on the optimization of iron ore reduction with hydrogen fuel in a laboratory condition to achieve stoichiometric values for the route. Four scenarios with different fuel blending options are applied to existing gas turbine units with an installed capacity of 7.6 MW. In addition, technical and economic comparisons of the steel and power sectors are investigated under the use of 100% hydrogen fuel instead of conventional fuel, and the effect of using each 1 kg of hydrogen in the sectors is analyzed. The thesis includes 5 Chapters; Chapter 1: General introduction; Chapter 2: Experimental optimization works on reducing iron ore with hydrogen; Chapter 3: Development of a multi fuel-fired gas turbine in the existing power unit of Fergana combined heat and power plant; Chapter 4: Comparative technical and economic analyses of hydrogen-based steel and power sectors; Chapter 5: General discussion and conclusions. This study reveals that the power sector in Uzbekistan has several gas turbine units in operation with a capacity ranging from 7.6 MW to 650 MW. An additional and alternative fuel to the gas turbine can be ammonia, but significant NOx emissions are a challenging point to replace natural gas. Therefore, in the short term, hydrogen combustion can be a potential option for replacing natural gas in the power sector. After evaluating the candidate's interview responses and the revisions made to the dissertation, all the committee members unanimously judged that the candidate is qualified to receive the degree of "Doctor of Philosophy in Engineering."			