（様式 5）

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学位（博士）論文要旨

(Doctoral thesis abstract)

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論 文 題 目 (Title)	Stray-corrosion-free surface texturing through electrochemical machining with electrolyte absorbed in a porous solid ball （多孔質固体ボールに吸収された電解液を用いた電解加工による漂遊腐食のない表面テクスチャリング）

論文要旨（2000 字程度）
(Abstract(400 words))
※欧文・和文どちらでもよい。但し、和文の場合は英訳を付すこと。
(in English or in Japanese)

Electrochemical machining (ECM) is a non-conventional machining method, during which, electrochemical reactions are used to remove materials at the atomic level with no contact between the workpiece and the tool electrode. Due to these advantages like high speed, low stress, and no tool wear, it is usually used in difficult-to-machine materials processing. While due to the electrolyte flows in the working gap between the workpiece and the electrode, the stray-current causes the stray-current corrosion, which decreases the processing accuracy and the surface quality, occurring in ECM.

In this research, aiming at controlling the distribution of the electrolyte and the machining current in surface texturing to eliminate the stray-current corrosion, a new ECM method was created, and a kind of porous solid ball, called MFS-ball, was chosen to be used as the electrolyte absorption material in ECM processing.

This dissertation consists of 10 chapters.

Chapter 1 “Introduction” about the principle, advantages, and disadvantages of ECM, and the research purposes of this study about eliminating the stray-current corrosion and the rust corrosion during ECM were reported.

Chapter 2 “Processing material, method, mechanism, and results” summarized the selection of electrolyte absorption material of MFS-ball, electrolyte absorption principle of capillary action, processing method and mechanism, and experimental results of surface texturing with the ECM method.

Chapter 3 “Simulation and verification” reported the simulation results about the potential between the workpiece and the electrode, the machining current density distribution at the processing area, and cross-section profiles of the processed result. In addition, by comparing the actual experiments and the simulation results, the relationship between them and the reason for the

depth difference of the processed results were summarized, and then the simulation results were verified.

Chapter 4 “Influence of experimental parameters and optimal parameters selection” explored the influences of several main experimental parameters, which include the electrolyte flow rate, the pressure between the MFS-ball and the workpiece, the pre-scanning, the current value, the machining time, the moving speed of the workpiece, and the size error of the MFS-ball, to the processed results. At the same time, some optimal parameters and solutions were selected to be used in the following research.

Chapter 5 “Applications of this ECM method” focuses on expanding the future applications of surface texturing using this ECM method, three kinds of surface texturing, which include the wide grooves processing with various cross-section shapes, metal marking in the metal workpiece surface, and oil pockets processing.

Chapter 6 “Conclusions” summarizes findings, shortcomings, and future issues obtained in this study.

（英訳）※和文要旨の場合(400 words)