

・研究課題名 = 「Elemental Study of Recycling and Disposal for Polymer Electrolyte Fuel Cells」

・研究代表者名及び所属 = Hidenobu Shiroishi (Tokyo National College of Technology), Ryo Shoji (Tokyo National College of Technology), Itaru Kato (Tokyo National College of Technology), Masayuki Kunimatsu (Kanagawa Industrial Technology Center)

・要旨 = (200 語以内) The subjects for recycling rare metal in a polymer electrolyte fuel cell were studied from the chemical and environmental aspects. It is clarified that the distribution of platinum depends on the preparation methods for membrane electrode assembly. Platinum catalyst in the membrane electrode could not be dissolved completely with chemical methods. The platinum dissolution using an electrochemical method was optimized with various electrical waveforms. The platinum catalyst was reproduced directly with a selective reductive deposition-microwave hybrid method.

Fuel cells are composed of separator, electrolytes, electrodes, catalysts made of metals such as Co, Ni. Leaching of Co, Ni, and other catalytic heavy metals from waste fuel cells poses possible environmental risk during dumping. The individual Co and Ni toxicity to the green alga *Pseudokirchneriella subcapitata* (*P. subcapitata*) were investigated. Acute 72 h growth inhibition assays with *P. subcapitata* were performed according to the OECD ecotoxicity test guideline 201. The NiCoFe/C fuel cell catalyst was assessed for their leaching properties under various pH conditions. Toxicity of Co and Ni leached from the real fuel cells were also observed with *P. subcapitata*. Our result indicates that the tested fuel cell catalyst was significantly toxic to ecosystems when dumping.

・キーワード = (5 語以内) rare metal, fuel cell, recycling, disposal, toxicity