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博士の専攻分野の名称： 博 士（食資源学）

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Development of Absorbents for Removal of Pollutants from Hydrosphere

(水圏からの汚染物質除去のための吸着材料の開発)

Alginate, starch, and graphite porous carbon are well-known as an absorbent for removing toxic substances in the hydrosphere. In this study, a porous carbon electrode composited with bio-absorbents was investigated with the electrochemical method. The doping capacity of bio-absorbent doped porous carbon electrodes was evaluated by SEM, XRD, Raman Spectroscopy, and 3D laser microscopy.

Doping capacity of the alginate/porous carbon electrode was determined by the concentration of alginate solution whether gel or sol formation. It was found that the sorption efficiencies of sol and gel- alginate doped porous carbon were almost comparable (approximately 15% to 20%) in case of the absence of electrochemical potential. On the other hand, the sorption efficiency of 1 cm² sol- alginate doped porous carbon behaved approximately 100% in 60 min at -0.5 V of potential. Doping capacity of the amylose/porous carbon electrode in 120 min was evaluated and figured out an optimistic amylose concentration. To evaluate absorption ability concentration dependence of heavy metals from 10 mg/L to 250 mg/L at a negative charge was examined. It was found that the heavy metals could be completely absorbed in a low initial concentration. For a practical application, this system was applied to absorb mixed heavy metal ions and arsenic compounds in the water. As a result, the concentration of heavy metal ions was decreased and the iron ions expressed the most absorbed in the 120 min absorption process. The new absorption isotherm was discussed for the new absorbent to figure out the absorption rate. The results of this research show high potential for toxic substances removal from discharged water. It was inferred that the electrochemical driving force could be too strong to show the ion size effect in the solution. But this hypothesis does not have evidence so far. However, this study succeeded to show that the electrochemical driving force can be improved the ability of absorbent.