

Selective Adsorption of Ions by Porous Electrodes

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Summary

Recovery of useful ions and removal of harmful ions from seawater are long standing problems. Recently, recovery of lithium ions from seawater and removal of radioactive cesium ions are among the most urgent ones of those kinds. To solve those problems, adsorption techniques using various porous materials have been applied. Those techniques, however, are expected to consume a large amount of chemicals and generate a large amount of waste in the long run, which are problematic from the viewpoint of protection of environment and resource.

As a technique to avoid such problems, we are examining the electrochemical one using porous electrodes for which the pore size is at the nanometer scale. In the previous year, we have conducted electrochemical experiments using activated carbon fibers as the electrode and multi-component aqueous solutions as the electrolytes and have found that there seem to be conditions at which selective adsorption of ions occur. This year, in order to make sure that the concentration of the aqueous solutions that are prepared is actually the desired value, possibility of contamination of ions from sources such as the electrode, the separator, the current collector, or the sample bottles was examined.

We found that contamination of ions from the electrode, the separator, and the sample bottles are not in the negligible levels. We therefore employed two methods of washing the electrochemical system and were able to reduce contamination to a satisfactory level. Furthermore, optimization of the weight ratio of the cathode and anode and preparation of electrodes with different pore sizes were also conducted.