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Effect of flow rate and concentration difference on reverse electrodialysis system[1] KILSUGN KWON, JAESUK HAN, DAEJOONG KIM, Department of Mechanical Engineering, Sogang University — Various energy conversion technologies have been developed to reduce dependency on limited fossil fuels, including wind power, solar power, hydropower, ocean power, and geothermal power. Among them, reverse electrodialysis (RED), which is one type of salinity gradient power (SGP), has received much attention due to high reliability and simplicity without moving parts. Here, we experimentally evaluated the RED performance with several parameters like flow rate of concentrated and dilute solution, concentration difference, and temperature. RED was composed of endplates, electrodes, spacers, anion exchange membrane, and cation exchange membrane. Endplates are made by a polypropylene. It included the electrodes, flow field for the electrode rinse solution, and path to supply a concentrated and dilute solution. Titanium coated by iridium and ruthenium was used as the electrode. The electrode rinse solution based on hexacyanoferrate system is used to reduce the power loss generated by conversion process form ionic current to electric current. Maximum power monotonously increases as increasing flow rate and concentration difference. Net power has optimal point because pumping power consumption increases with flow rate.

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