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P4.174 Lithium isotope enrichment by electrodialysis using solid lithium electrolyte

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In thermonuclear fusion reactor, tritium generated by nuclear reaction of lithium isotope with mass number six (6Li) and neutron is used as fuel. To maintain the nuclear reaction in the reactor, it is necessary to concentrate the 6Li isotope, which exists at only about 7.8mol% naturally, to 40–90wt%. The mercury amalgam method is the only practical method, but its environmental burden is large [1,2]. As advanced method, Kunugi et al. reported that it is possible to condense the 6Li by electrodialysis using lithium ceramics [3]. Hoshino has studied another electrodialysis method using a porous polymeric diaphragm impregnated with a liquid electrolyte [4]. In either method, in principle it is possible to increase the 6Li concentration by cascading, but the separation factor of one step is small. Most recently, our research using lithium-ion conducting solid electrolyte membranes discovered that by applying voltage with an intermittent profile, the condensation efficiency of 6Li can be increased [5]. In the present work, we investigate the influence of application time, cutoff time and voltage value on the isotope enrichment rate. The isotopic enrichment rate is estimated by the lithium isotope concentration analyzed by inductively coupled plasma-mass spectrometry. This research shows the followings. The concentration rate in a short time immediately after the start of voltage application is high, the rate is improved with sufficiently long interruption time, and the magnitude of applied voltage and the direction of voltage application also influence.

[1] G. N Lewis, et al., J. Am. Chem. Soc., 58(12), 2519–2514 (1936).
[2] K. Okuyama, et al., J. Inorg. Nucl. Chem., 35(8), 2883–2895 (1973).
[3] S. Kunugi, et al., Solid State Ionics, 122, 35-39 (1999).
[4] T. Hoshino, et al., Fusion Eng. Des., 86(9-11), 2168-2171 (2011).
[5] S. Honda, et al., J. Ceram. Soc. JPN, in press (2018).

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