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Final results from the CDX-U lithium program[1] R. MAJESKI, T. GRAY, R. KAITA, H. KUGEL, D. MANSFIELD, J. SPALETA, J. TIMBERLAKE, L. ZAKHAROV, PPPL, R. MAINGI, ORNL, V. SOUKHANOVSKII, LLNL
— In the latest and last phase of experiments with liquid lithium plasma limiting surfaces in CDX-U, prior to construction of the Lithium Tokamak eXperiment, two new techniques for producing wall coatings of lithium have been tested – a resistively heated evaporator (poster by D. Mansfield) and an electron beam heated system. The resistive system continuously deposits lithium on the walls and center stack limiter of CDX-U, while the e-beam system deposits lithium films of up to 1000 Å thickness between discharges. The use of these systems has resulted in the highest edge plasma pumping rate ever reported in a magnetically confined plasma, with τ_p* values of < 2 msec, and recycling coefficients $< 50\%$. The e-beam experiments also simulate conditions of high localized power deposition (power density up to 50 MW/m^2 in a 0.3 cm^2 spot) during evaporation. Surprisingly, convective transport of heat away from the beam spot is so effective that it is necessary to heat the entire lithium inventory (140 g), rather than just the area under the beam spot, to the point of evaporation (T $>$ 400–500 $^\circ$C). These results are promising for the implementation of lithium plasma-facing components in reactor scale devices.

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