Abstract Submitted
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Low impurity concentrations and enhanced confinement in the Lithium Tokamak Experiment (LTX)[1] D.P. BOYLE, R.E. BELL, R. KAITA, R. MAJESKI, J.C. SCHMITT, PPPL, F. SCOTTI, LLNL, T.M. BIEWER, T.K. GRAY, ORNL — Significant improvements in confinement and overall performance have been shown in many devices using lithium wall-coatings, though impurities have often been an issue. Previous results with partial coatings in LTX, a modest-sized, ohmically-heated spherical tokamak, demonstrated energy confinement times exceeding ITER ELMy H-mode scalings. Here we report the results of new experiments with fully lithium coated walls, including first-ever successful operation of a tokamak plasma with a full liquid lithium wall. Energy confinement estimates based on magnetic analysis exceed the ITER98P scaling by 2-4x, and can now be confirmed with electron temperature and density profiles from Thomson scattering. Past attempts at a full liquid Li coating in LTX were unsuccessful, with difficulty achieving breakdown and short, cold, impurity dominated plasmas. Now, spectroscopic measurements in discharges with full liquid coatings indicate low core core impurity concentrations of Li, C, and O. The implications for impurity transport will be discussed. The results for confinement and impurity behavior with solid and liquid lithium on stainless steel surfaces in LTX are relevant to future devices and upgrades with all-metal walls, including NSTX-U.

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