Abstract Submitted
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High-temperature, liquid lithium plasma-facing component research for NSTX-U and next-step devices[1] MICHAEL JAWORSKI, TYLER ABRAMS, ROBERT GOLDSTON, ROBERT KAITA, ANDREI KHODAK, JON MENARD, MASA ONO, JACOB SCHWARTZ, CHARLES SKINNER, DAREN STOTLER, Princeton Plasma Physics Laboratory, TRAVIS GRAY, Oak Ridge National Laboratory, GREG DE TEMMERMAN, JOHN SCHOLTEN, MIRANDA VAN DEN BERG, HENNIE VAN DER MEIDEN, FOM-DIFFER — Liquid metals offer significant potential advantages as plasma-facing component materials including the elimination of net-reshaping due to plasma erosion. Large erosive fluxes may also result in a "vapor-shielded" regime to further reduce the incident heat flux. Engineering design studies indicate that near-term cooling technologies will enable cooling of liquid lithium PFC surfaces to temperatures of 700-900C with $10 MW/m^2$ incident where the lithium vapor pressure is comparable to scrape-off layer plasma pressures. Experiments conducted on the Magnum-PSI linear plasma device provide the first data in a quasi-steady, divertor-like plasma (T_e 2eV, N_e $2 \times 10^{20} m^{-3}$). Lithium layers tested in the plasma indicate very high redeposition fractions exist near the target surface with lifetimes of 3-4s. These experiments provide the first feasibility assessments of a continuously-vapor shielded regime for use in the NSTX-U.

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