Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

The effect of progressively increasing lithium coatings on plasma performance, and the underlying role of collisionality, in the NSTX R. MAINGI, ORNL, S.M. KAYE, D.P. BOYLE, PPPL, J.M. CANIK, ORNL, T.H. OSBORNE, P.B. SNYDER, GA — Lithium wall coatings have been shown to both improve energy confinement and eliminate ELMs in NSTX. Here, we present analysis of variable pre-discharge lithium evaporation from multiple experiments. First, a nearly continuous improvement of several discharge characteristics, e.g. reduced recycling, ELM frequency, and edge electron transport, with increasing pre-discharge lithium evaporation has been identified [Maingi, *NF* **52** (2012) 083001, and refs. therein]. Profile and stability analysis has clarified the mechanism responsible for ELM avoidance and the role of lithium: lithium coatings reduce recycling, core fueling, and thus the density and its gradient near the separatrix. The temperature gradient near the separatrix is unaffected; hence the pressure gradient and bootstrap current near the separatrix are reduced, leading to stabilization of kink/peeling modes thought to be responsible for the NSTX ELMs; the ELM-free pedestal is seen to expand by 100%. Furthermore, the normalized core confinement scalings are consistent with boronized wall results when viewed as a function of collisionality. *Research sponsored in part by U.S. Dept. of Energy under contracts DE-AC05-00OR22725, DE-AC02-09CH11466, DE-FC02-04ER54698, DE-AC52-07NA27344, DE-FG03-99ER54527 and DE-FG02-99ER54524.

Rajesh Maingi
Oak Ridge National Laboratory

Date submitted: 11 Jul 2012 Electronic form version 1.4