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Identification and time evolution of impurities in NSTX plasmas
J.K. LEPSON, SSL, P. BEIERSDORFER, LLNL, M. BITTER, L. ROQUEMORE, G. ZIMMER, S. GERHARDT, J. KALLMAN, R. KAITA, PPPL — Operation of the NSTX tokamak with lithium-coated plasma facing components has shown many beneficial changes, including MHD quiescence and higher electron temperatures near the edge. Impurity accumulation, however, is of concern, especially during ELM suppression. Spectroscopic diagnostics are important in determining the composition and concentration of plasma impurities, which can vary dramatically between shots and for different run conditions. We present data from the Livermore XEUS and LoWEUS spectrometers, which observe the extreme ultraviolet and soft x-ray regions on NSTX. XEUS and LoWEUS are complementary, and have been set up to cover the 10-250 A range during the most recent run period. Because of their higher spectral resolution than provided by SPRED, the instruments can discern lines from different elements and charge states. We have also implemented time resolved data acquisition, providing the first data on when the particular metal impurities appear in the plasma. The time resolution has been 130 ms. This value is expected to improve in the near future. We present spectra from NSTX exhibiting a wide range of impurities, including lithium, boron, carbon, oxygen, neon, titanium, iron, nickel, and copper, which serve as reference spectra for tracking the different impurities.

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