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Erratum: "Experimental determination of *S/XB* values of W I visible lines" [Phys. Plasmas 16, 122503 (2009)]

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We have recently remeasured S/XB values for W I lines at λ=400.8, 429.4, 498.2, and 505.3 nm at higher electron densities n_e, which was achieved by upgrading the plasma source of PISCES-B. The parameter space of n_e and electron temperature T_e for the new measurements is shown in Fig. 1 and compared with the previous values.[1] Under these conditions, newly measured S/XB values for the W I lines are found to be approximately five to ten times lower than the previously reported values,[1] as shown in Fig. 2. As a consequence, the new data for the 400.8 nm line are in good agreement with the previously reported data from other devices.[2–4] Compared to theoretically calculated values,[5] our new data are systematically lower for all the lines.

The previous data[1] were obtained under the plasma parameters, where the critical condition in this method (the geometrical loss flux of sputtered W atoms, Γ_W^{GL}, is negligible) is not satisfied. Thus, the S/XB values in Ref. 1 were overestimated. This was caused by the overestimation of the characteristic length of the system L, leading to the underestimation of Γ_W^{GL}. The plateau radius ($\sim$10 mm) of n_e (T_e is nearly flat over the plasma radius) should have been taken instead of the plasma radius of $\sim$25 mm. In addition, the calculated ionization mean free path of sputtered W atoms, λ_{mfp}^{calc}, is shorter than the actual one, λ_{mfp}^{act}, as shown in Fig. 2(b) of Ref. 1, because of a drop in n_e from the measured location (axial position $z\sim$150 mm) toward the target due to the presheath acceleration.[6] For the new conditions, the fraction of Γ_W^{GL} to the flux of sputtered W atoms, Γ_W^{Spt}, is estimated from $\exp(-L/\lambda_{mfp}^{act})$ to be $<5\%$ with $\lambda_{mfp}^{act}=2\times\lambda_{mfp}^{calc}$, while $\Gamma_W^{GL}/\Gamma_W^{Spt}$ is up to $\sim$40% for the previous conditions.

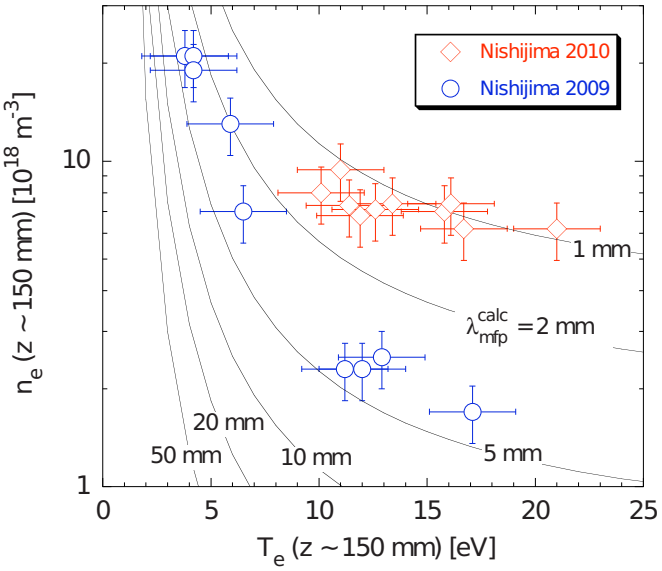

FIG. 1. (Color online) n_e vs T_e around the center of the plasma column measured at an axial position $z\sim$150 mm with a reciprocating double probe. Circles are taken from Ref. 1, while diamonds are newly obtained. Ionization mean free paths of sputtered W atoms, λ_{mfp}^{calc}, are calculated with n_e and T_e at $z\sim$150 mm, and are drawn by solid lines.

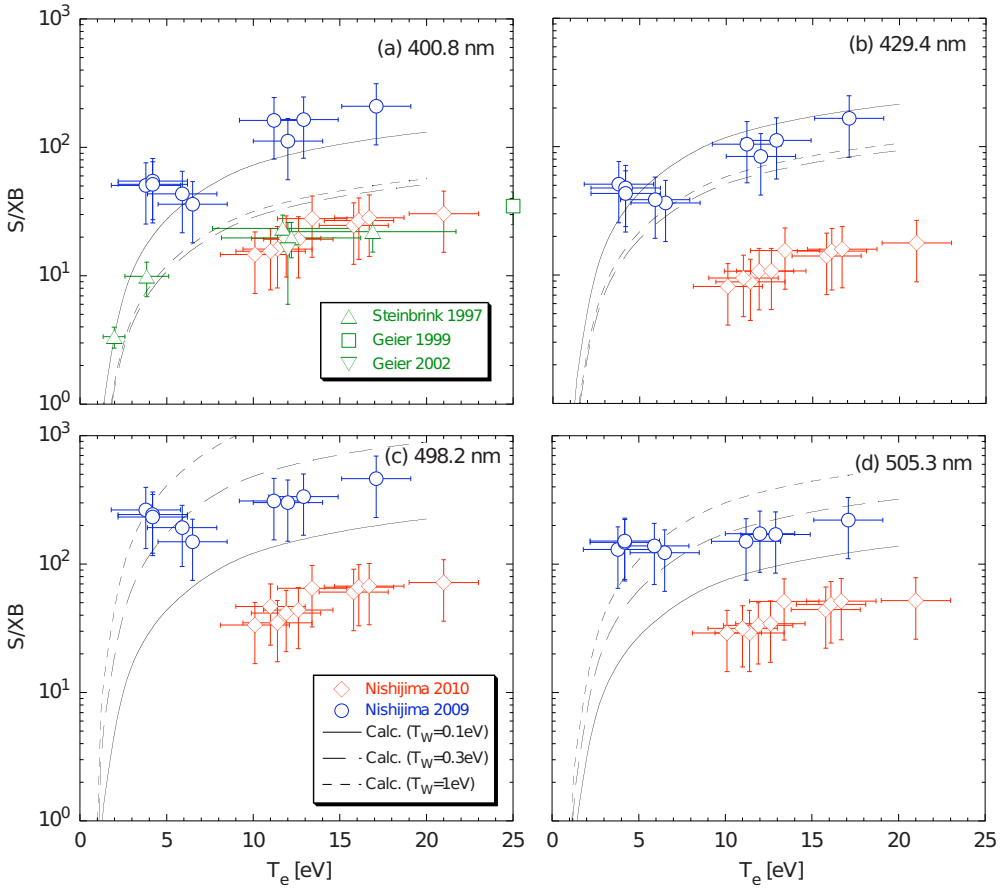

FIG. 2. (Color online) S/XB values for the W I lines: (a) 400.8, (b) 429.4, (c) 498.2, and (d) 505.3 nm. The measured data are plotted as diamonds (this work), circles (Ref. 1), triangles (Ref. 2), squares (Ref. 3), and inverse triangles (Ref. 4). The calculated data (Ref. 5) are shown by solid (T_W=0.1 eV), long-dashed (T_W=0.3 eV), and short-dashed (T_W=1 eV) lines.

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