*34th EPS Conference on Plasma Phys. Warsaw, 2 - 6 July 2007 ECA Vol.**31F**, P-5.073 (2007)*

DIAGNOSTICS OF PURE METALLIC CHROMIUM PLASMA

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Wind holes and the top of lances in iron work industry have to be coated with high temperature resistant coatings in order to increase their lifetime. Refractory metals such as Cr, Ni, W, and Re are promising candidates for improving high temperature resistance due to their high melting points. Single refractory metal layer or multiple components as Re-Ni-Cr film were prepared to achieve this objective by the original thermionic vacuum arc (TVA) method [1].

The electron temperature (T_e) of the metallic plasma is an important parameter of the processing plasma. T_e was evaluated for TVA plasma running in pure Cr atoms. The method consists in selecting two representative lines of Cr. Using the ratio of their relative intensities (I_1 and I_2) T_e was estimated using a formula based on the Boltzmann distribution of the excited species.

The light produced by the pure Cr plasma has been imaged onto the entrance slit of a SM-240 CCD Spectrometer using an UV type optical fiber.

T_e of chromium TVA plasma estimated using ratio of Cr I 357.8684 nm and Cr I 425.4332 nm lines was found in the range of 0.4 to 2 eV and was correlated with the morphology and the structure of Cr layers.

References

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