Progress Report

SPECTROSCOPIC DATA OF W I, Mo I AND Cr I SPECTRAL LINES: SELECTION AND ANALYSIS

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Composite materials on a base of copper with addition of refractory metals are widely used as electrode or contact materials in electrotechnical industrial applications (e.g. relays, commutators, circuit breakers etc.). The emission spectra of plasma of electric arc discharge between such materials contain spectral lines of Cu (which are well-studied) and refractory metals (W, Mo and Cr). So, such plasma can be used as spectroscopic instrument for analysis and selection of WI, MoI and CrI spectral lines and their spectroscopic data. The main aim of this paper is selection of WI, MoI and CrI spectral lines and appropriate spectroscopic data for the purposes of plasma diagnostic. Electric arc discharge plasma between composite Cu-W, Cu-Mo and Cu-Cr electrodes were studied. Original user interface were used for emission spectra registration and interpretation. Abel inversion for obtaining of local values of spectral intensity was used because of side-on (lateral) observation of plasma object. Obtained radial profiles of intensity were corrected in accordance to setup spectral sensitivity. Spectroscopic data (oscillator strengths) values for WI, MoI and CrI from various sources are significantly different. So, it was decided to use Boltzmann plot method as instrument for WI, MoI and CrI spectral lines and their spectroscopic data selection. If plasma is in local thermodynamic equilibrium, then the slope of Boltzmann plot lines corresponding to each spectroscopic plasma components must be the same. This slope depends on the excitation temperature of thermal plasma. Values of oscillator strength for WI, MoI and CrI spectral lines, which are best satisfy to the slope for CuI energy levels were chosen.