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Optical emission spectroscopy diagnostic of pure vapor Ni plasma

CORNEL POROSNICU, ANA MIHAELA LUNGU, CATALIN TICOS, CRISTIAN P. LUNGU, National Institute for Laser, Plasma and Radiation Physics, Romania — The method studied extensively in our group for materials processing is based on the thermionic vacuum arc (TVA) principle. In TVA, the high-density plasma is localized above the anode, whereas the substrates are placed away from the core of the plasma. This enables thin films deposition to be carried out at low substrate temperatures even for the highest melting point materials. Also, although it is arc plasma, the TVA can be used to prepare particle free films of pure materials. The TVA plasma parameters were evaluated using the analysis of the optical emission radiation of the plasma running in pure vapors. The plasma parameters obtained are anode (Ni pool) temperature, vapor pressure, evaporation rate and electron temperature (evaluated by using the ratio of the atomic emission lines) as function of the dissipated power between electrodes. It was found that plasma parameters are increasing with the power and during arc plasma have relatively constant values.

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