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Invited Lecture

OPTICAL EMISSION OF HELIUM CRYOPLASMA

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Fluorescence spectroscopy is a powerful tool for obtaining information on microscopic processes taking place in non-equilibrium discharge plasma produced within a dense medium such as high pressure supercritical gas or even liquids. Spectroscopic analysis of light emitted from the ionization zone near the discharge tip electrode can be used to interrogate the local environment around the emitting atoms and molecules. The observed spectral features are sensitive to the dynamic processes taking place during the emission, which makes fluorescence spectroscopy a powerful tool for studying cold nonequilibrium plasmas as a function of pressure and the temperature. In this work, we have measured the current-voltage characteristics and spectral composition of helium cryoplasma initiated by corona discharge in gaseous and liquid helium. The experiments were carried out at a number of fixed temperatures from 300 K down to 4.2 K and pressures varying from 0.1 to 10 MPa, which cover a wide range of helium densities ranging from *ca.* 10^{19} cm^{-3} (gas) up to 2×10^{22} cm^{-3} (liquid).