

Optical emission spectroscopy for atmospheric pressure plasmas: Principles and applications

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Atmospheric pressure plasmas have attracted great attentions due to their many advantages such as no need of high vacuum equipments, in-line process, and high radical concentrations. In order to investigate the plasma characteristics, the spectroscopic methods are frequently favored because conventional electrostatic probes are generally less useful due to the frequent collisions between species at atmospheric pressure. In general, the optical spectroscopy is classified into two main methods: active methods (eg. optical absorption spectroscopy: OAS) using external optical excitation sources, and passive methods (eg. optical emission spectroscopy: OES) analyzing spectra emitted from plasma. Especially the OES method is simple and easy to investigate plasma characteristics. A spectrum emitted from plasma provides some important information such as identification of existing species such as atoms, molecules, and radicals, and also plasma temperatures and electron density through spectrum analysis. In this work, we present the basic principles of spectroscopic methods and their applications for measuring plasma parameters in various atmospheric pressure plasmas.