Plasma diagnostic through the five prominent oxygen triplets
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Dublin City University, Ireland, SHANE MCLOONE, JOHN RINGWOOD, Department of Electronic Engineering, National University of Ireland, Ireland — Oxygen
is one of most frequently used gas in plasma discharge. Therefore, determination of
plasma parameters through analysis of oxygen emission would be a powerful tool.
Fifteen most promenade oxygen spectral lines have been measured at different experimental plasma condition. Those oxygen lines belong to five oxygen triplets: 777,
844, 645, 725 and 615 nm. These fifteen O I spectral lines belong to the different
transitions/multiplets and have the different upper energy level. The difference of
upper energy levels among these oxygen spectral lines is greater than 2 eV. Also,
the spectral lines from triplets 645 nm, 725 nm and 615 nm of O I have an upper energy level very close to dissociation of molecular oxygen (12.06 eV). Data is
collected for a range of operator contribution in an Ar-O_2-Cl/HBr/C_2F_6 gas mixture discharge, by Jobin Yvon spectrometers. The emission strengths and profile
shapes are found do be dependent on plasma tool settings (power, gas mixture and
pressure). Correlation of plasma internal state will be presented.

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