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The electro-negative character of He/O_2 cold atmospheric pressure plasmas[1] JOCHEN WASKOENIG, TIMO GANS, Centre for Plasma Physics, Queens University Belfast, BT7 1NN Belfast, Northern Ireland, UK — Cold radio-frequency (RF) driven atmospheric pressure plasmas in helium with a small admixture of oxygen can produce large number densities of reactive oxygen species, which is of particular interest for sensitive surface treatments, e.g. in bio-medicine. 1-D numerical simulations reveal that the sheath and electron dynamics are significantly influenced by comparatively high densities of negative ions. The latter can not respond instantaneously to the rapidly changing RF electric field and are confined to the time averaged plasma bulk. In the plasma center the quasi-neutrality condition is fulfilled by both, electrons and negative ions, while at times of sheath collapse this condition has to be fulfilled by electrons exclusively. Therefore, maximum electron density is observed in close vicinity of the electrodes, rather than in the plasma center as for electro-positive plasmas. The negative ion density scales with the mean electron energy and is independent of the electron density. Hence, it decreases with power, whereas the electron density increases. This results in a decrease of the electro-negativity towards higher input powers.

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