

Mass spectrometry investigation of positive and negative ions generated by a RF capacitively coupled discharge at atmospheric pressure in He-H₂O

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Mass spectrometry investigation of positive and negative ions generated by a RF capacitively coupled discharge at atmospheric pressure in He-H₂O YOLANDA ARANDA GONZALVO, Plasma and Surface Analysis Divison, Hiden Analytical Ltd, Warrington, United Kingdom, FELIPE IZA, Loughborough University, Department of Electronic and Electrical Engineering, UK, PETER J. BRUGGEMAN, Eindhoven University of Technology, Department of Applied Physics, The Netherlands — An RF excited Atmospheric pressure glow discharge APGD (13.56MHz) between two parallel bare metal plate electrodes in He-H₂O mixtures has been investigated by molecular beam mass spectrometry (MBMS) at the plasma sheath. The choice of water is motivated by the important presence of OH in atmospheric plasmas with liquid interaction and its growing interest. The dependence of the water concentration at constant power of the ionic species for both positive and negative ions is investigated. Positive and negative ion cluster formation increases with increasing concentration of water vapour at constant power of 20W. For all the investigated concentrations of He-H₂O mixtures the dominant positive ions are H₃O⁺, OH⁺, O⁺, He₂⁺, HeH⁺, O₂⁺ and H₃⁺. For negative ions dominant ion is OH⁻ and its clusters. In view of the low concentration of water at which negative ions start to influence the plasma properties, the effect of negative ions in atmospheric pressure plasmas with small amounts of water vapour or O₂ will be important.

Yolanda Aranda Gonzalvo
gonzalvo@hiden.co.uk

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Plasma and Surface Analysis Divison, Hiden Analytical Ltd,
420 Europa Boulevard, Warrington WA5 7UN, United Kingdom

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