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Characteristics of helium/water vapour jet plasmas JINGJING LIU, MICHAEL KONG, PLASMA AND PULSED POWER GROUP TEAM — Stable low-temperature plasmas which possess abundant chemically reactive species (nitrogen and oxygen related species) are required for biomedical applications such as wound disinfection and healing. A needle-ring DBD plasma jet with flowing helium gas is used in this paper to achieve the low gas temperature plasmas. Water vapour is mixed in the flowing gas in order to produce more oxygen and hydrogen related active species in the plasmas. Electrical and optical characteristics of the helium/water vapour jet plasmas are studied. There are four different modes of the plasmas, among which the bullet mode and arc mode without voltage distortion are particularly investigated. Bullet mode will disappear while the moist helium flow rate is higher than 300sccm. Higher moist helium flow rate results in slower bullet velocity and weaker bullet intensity. Active species production in both bullet and arc modes increases with adding modest water vapour in the gas mixture, but decrease with further more water vapour. Rotational, vibrational and excitation temperatures are all influenced by the moist helium flow rate. Electron density plays significant role in producing the active species in bullet mode. Water vapour concentration together with the electron density in arc mode affects the active species generation.

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