

The presented work focuses on study of electron – positive ion recombination in low temperature plasma. The principal method used were Flowing afterglow with Langmuir probe and Stationary afterglow with Cavity Ring-Down Spectrometer. For the first time electron and neutral assisted collisional radiative recombination of Ar^+ ions was studied in temperature range of 50 – 200 K. Resulting ternary recombination rate coefficients are in good agreement with theoretical predictions. Recombination of H_3^+ and D_3^+ ions with electrons was studied in the temperature range of 50 – 300 K and binary and ternary recombination rate coefficients were obtained. The effect of nuclear spin on recombination of H_3^+ ions with electrons was studied in the temperature range of 80 – 200 K and state selective recombination rate coefficients were obtained for ortho- and para- H_3^+ . Results show that at 80 K para- H_3^+ recombines with electrons substantially faster than ortho- H_3^+ .