Abstract Submitted
for the GEC06 Meeting of
The American Physical Society

Possible Mechanism of "Additional" Production of H^- in a Glow Discharge S. BELOSTOTSKIY, D. ECONOMOU, D. LOPAEV, T. RAKHIMOVA, NUCLEAR PHYS. INST., MSU TEAM, DEPT. OF CHEM. ENG., U. OF HOUSTON TEAM — Based on measurements of H^- and H densities a DC glow discharge in H_2 (P=0.1-3 Torr) the rate coefficient of H^- production as a function of E/N was determined. To analyze the mechanisms of H^- production, a simple model of H_2 vibrational excitation was developed. Estimations of vibrational level densities (v=3-5) obtained from VUV absorption measurements were in reasonable agreement with the calculated data. The analysis revealed that standard mechanisms of H^-production (dissociative attachment to vibrationally excited molecules $H_2(v)$ and molecules in Rydberg states $H_2(Ry)$) were not enough to explain the experimental results. In order to describe both the shape (vs E/N) and the magnitude of the measured H^- production rate coefficient, an "additional" source of H^-, having a strong resonant electron attachment CS in the range of ∼5-9 eV, should be invoked. Although H_2 has no resonances in the 5-9 eV range, water is known to strongly dissociatively attach in this range. Thus, even small amounts (0.1-1%) of water vapor in the apparatus can explain the origin of the "additional" H^- production. This result is corroborated by the work of Cadez *et. al.* in Proc. of XXVII ICPIG, 2005. This work was supported by the RFBR (No.05-02-17649a), Scientific School - 171113.2003.2 and NATO Collaborative Linkage Grant (No.980097).

Sergey Belostotskiy
Dept. of Chemical Engineering, University of Houston

Date submitted: 13 Jun 2006 Electronic form version 1.4